

★ P. 96 *More*
What's New For The 64

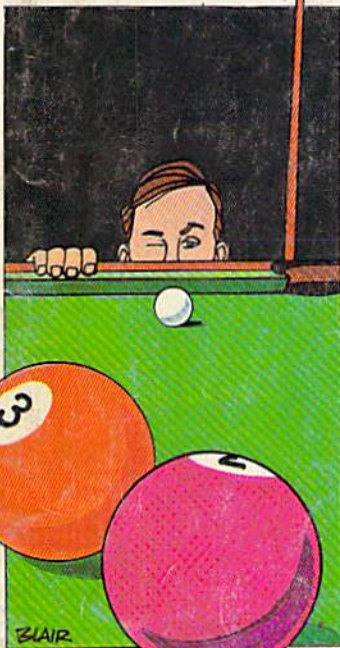
COMPUTER'S GAZETTE™

\$2.95
April 1985
Issue 22, Vol. 3, No. 4
02220 \$3.50 Canada

FOR **COMMODORE** PERSONAL COMPUTER USERS

The Winter Consumer Electronics Show

A first-hand look at the exciting new computers from Commodore.



Pool

Are you a pool shark or a novice? Find out in this challenging simulation of pocket billiards for the VIC and 64.

Power BASIC: Triple 64

Try this seven-line program that creates three independent 12K computers.

No-Zap

Never worry about power failures again. A short disk utility that automatically saves your work and updates files. For the VIC and 64.

Also In This Issue:

1526 Hi-Res Screen Dump

Machine Language For Beginners:
Customizing BASIC

Plus Reviews, Games, And Programming Tips

METABASIC

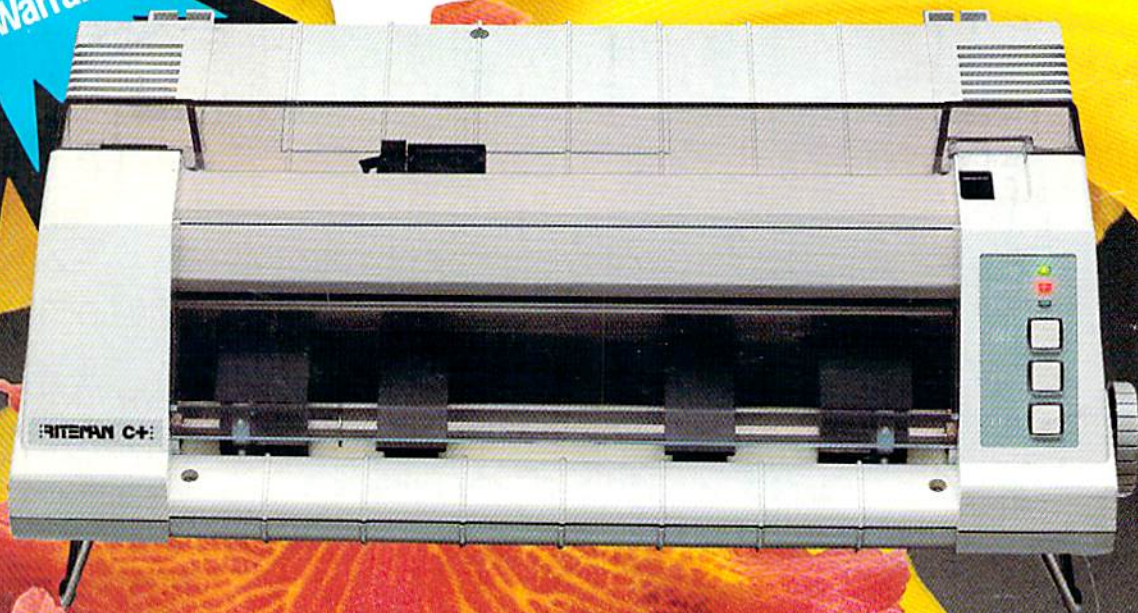
Add 32 new commands to your Commodore 64. An excellent programmer's tool.



COMMODORE RITEMAN



Plug-compatible with
Commodore* computers.
2 software built-in:
Commodore* & Epson**
compatibility
One-year Warranty



DISTRIBUTORS: Hamburg Brothers/NE 412-227-6239
Johnson Drug Company/SE 813-872-6631
Southern Electronics Distributors/SE 404-491-8962
Stokes Brothers/Utah 801-566-4117

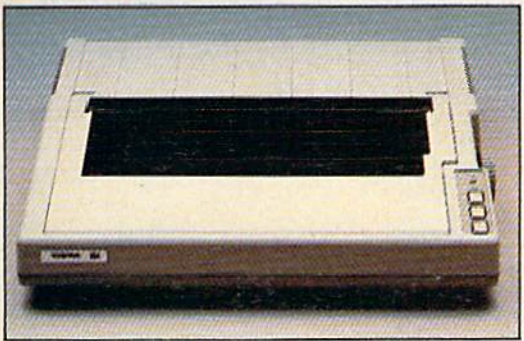
Frisco Electronics/TX 512-857-7741
Ryan Distributing/Rocky Mt. 801-972-4721
First Source/SW 602-263-1950
Southern Micro Distributors/TX 214-258-6636

* Compare these specs before you buy...

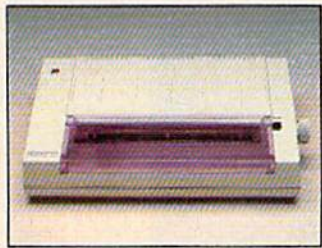
RITEMAN C+ vs. COMMODORE PRINTERS

FEATURES	RITEMAN C+		COMMODORE PRINTERS				
		ACTUAL PRINT	MPS 801	MPS 802	MPS 803	VIC1525	VIC1526
PRINT SPEED (CPS)	105		50	60	60	50	60
BIDIRECTIONAL PRINT	YES		NO	YES	YES	NO	YES
(COLUMN WIDTH)		40 CPL	NO				
40 CHARACTERS PER LINE	YES						
80 CHARACTERS PER LINE	YES	80 CPL					
66 CHARACTERS PER LINE	YES	66 CPL					
132 CHARACTERS PER LINE	YES	132 CPL					
(PAPER HANDLING)			NO				
FRONT LOADING FOR EASY PAPER SETTINGS	YES						
BUILT-IN PRINTER STAND	YES						
PRINT ON POST CARDS	YES						
(WARRANTY)							
ONE-YEAR WARRANTY	YES		NO				
(SOFTWARE COMMANDS)							
DOUBLE STRIKE	YES	DOUBLE STRIKE					
EMPHASIZED	YES	EMPHASIZED					
COMPRESSED	YES	COMPRESSED					
UNDERLINE	YES	UNDERLINE					
SUPER/SUBSCRIPTS	YES	SUPER_{SUB}SCRIPTS					
ITALICS	YES	ITALICS					
DOUBLE DENSITY BIT IMAGE	YES	CDR					
(CHARACTERS)							
9X9 FONT	YES						
TRUE DESCENDERS	YES	abcbjppqyabc					
ITALICS	YES	ITALICS					
COMMODORE GRAPHICS	YES	♦♦♦♦ ◡ ◡◡ ◡◡◡ ◡◡◡◡ ◡◡◡◡◡ ◡◡◡◡◡◡ ◡◡◡◡◡◡◡ ◡◡◡◡◡◡◡◡					
(OTHER FEATURES)							
SINGLE DENSITY BIT IMAGE	YES	CDR	YES	NO	YES	YES	NO
EXPANDED	YES	EXPANDED	YES	YES	YES	YES	YES
REVERSE	YES	REVERSE	YES	YES	YES	YES	YES

RITEMAN R64



RITEMAN LQ



LQ is available at Best Products. BEST®

*Commodore is a registered trademark of Commodore Business Machine, Inc.
**Epson is a registered trademark of Epson America Corp.

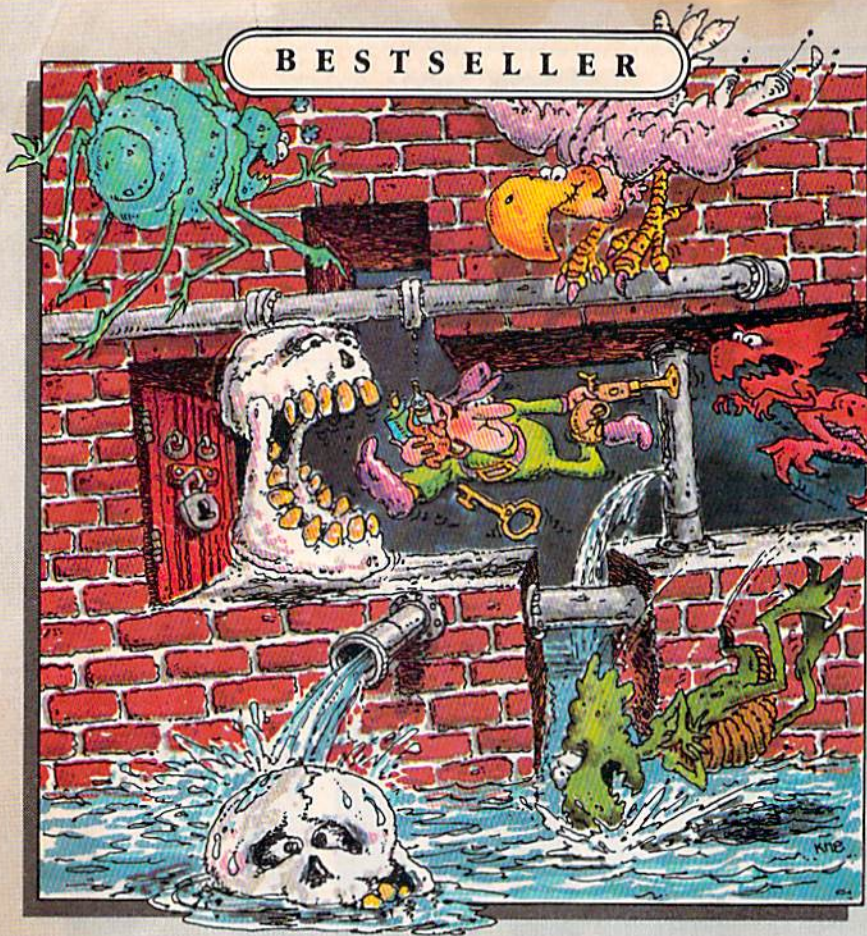
Features

- RITEMAN R64**
Same as above except:
- 120 cps
 - 2 ports: Centronics Parallel & Commodore*
 - Portable
 - Standard top loading

- RITEMAN LQ**
- Letter Quality Print
 - Portable — Only 6½ lbs.
 - Low price
 - Centronics Parallel

:RITEMAN:

BESTSELLER



TROLLS AND TRIBULATIONS

If you're a strategy action game fan, your collection isn't complete without Trolls and Tribulations. It's already on our bestseller list and bound to become a classic.

They're lurking in wait for you – an entire underworld full of sinister scavengers hidden away in a maze of dark caverns, rising waters and secret dungeons. Also tucked away in this treacherous maze are glorious treasures, thousands of years old.

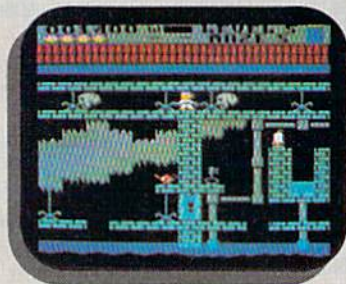
Disguised as a troll, you have entered the underworld to save the buried treasures. You have 32 eerie chambers to explore at 7 levels, and a wrong turn could spell disaster.

As you get deeper and deeper into the mysteries of the caverns, you'll discover that your wits are being tested more than your reflexes. And woeful is the troll who doesn't act quickly when confronted by troll-crunching cretins, flying buzzards and sinister skulls.

Trolls and Tribulations, this year's hottest hit from Creative Software.

For more information about Creative Software programs, call us, toll-free. We'll help you locate the Creative Software dealer nearest you and send you a FREE catalog too.

**800-331-7990 or
800-448-1001
(in California)**



For Commodore 64

\$24.95

Suggested retail price.

Also available for Apple II+ (64K),
IIe, IIc and Atari 800/800XL.

C R E A T I V E S O F T W A R E

960 Hamlin Court, Sunnyvale, CA 94089

FEATURES

The Winter Consumer Electronics Show: New Life In The Home Computer Market	Lance Elko	20	*
What is CP/M?	Charles Brannon	22	*
CES Perspective: Much More For The 64	Kathy Yakal	34	*
Inside View: Douglas Adams and Steve Meretzky, Designers Behind <i>The Hitchhiker's Guide To The Galaxy</i>	Sharon Darling	42	*

REVIEWS

<i>Dream House</i>	C. Regena	74
<i>Sargon III</i>	John Krause	74
<i>Turbo 64</i>	Lee Noel, Jr	76
<i>Stealth</i>	Gregg Keizer	78
<i>Mind Prober</i>	Selby Bateman	79
<i>Financial Cookbook</i>	Harvey B. Herman	86
<i>Reach For The Stars</i>	Neil Randall	87
<i>Seastalker</i>	James Trunzo	87

GAMES

Pool	Joseph T. Woyton	50	V/64
Apple Hunt	James Arlet	60	V/64
Astro-PANIC! For the VIC	Sean D. Wagle	58	V

EDUCATION/HOME APPLICATIONS

Computing For Families: The World Of Mimi The Ant	Fred D'Ignazio	60	*
Number Quest	Gerald and Betty Schueler	67	V/64

PROGRAMMING

Hints & Tips: Programmer's Notebook	Paul Barnes	70	V/64
Power BASIC: Triple 64	Feeman Ng	94	64
BASIC Magic: Putting Computer Math To Work For You	Michael S. Tomczyk	96	V/64/+4/16
Machine Language For Beginners: Customizing BASIC	Richard Mansfield	101	V/64
NoZap: Automatic Program Saver	J. Blake Lambert	110	V/64
1526 Hi-Res Screen Dump	Michael Frantz	113	64
MetaBASIC: Programmer's Problem Solver	Kevin Mykytyn	114	64

DEPARTMENTS

The Editor's Notes	Robert Lock	4	*
Gazette Feedback	Editors And Readers	8	*
Horizons	Charles Brannon	105	V/64
News & Products		121	*

PROGRAM LISTINGS

How To Type In COMPUTE!'s Gazette Programs	90	*
Bug-Swatter: Modifications And Corrections	92	*
Automatic Proofreader	122	V/64
Product Mart	145	*
Advertisers Index	160	*

* =General, V=VIC-20, 64=Commodore 64, +4=Plus/4, 16=Commodore 16.

THE EDITOR'S

notes

This month, Senior Editor Richard Mansfield discusses the two main approaches to programming.

—Robert Lock, Editor In Chief

An intriguing letter arrived here this week from the chairman of a high school computer department. He said that our magazines would not be used in his department because one of our published programs was not correctly written. The offending program, "Utility Bill Audit," was printed in a circulation flyer. His complaint centered on the style of programming. For one thing, the program contains no REM statements, no internal comments explaining the purpose of each line of the program.

He goes on: "There's (sic) so many GOTO and GOSUB statements . . . if any of the over 1,000 students in our district's Computer Studies Department ever submitted a program so sloppy . . . so unstructured and so undocumented, they (sic) would be sure to receive a failing grade."

The educational community has an important task: to prepare the minds of the next generation. Many teachers approach this difficult job with great skill and insight. Others, unfortunately, get lost in minutia, preferring to make easy judgments and present to their students an unpleasantly narrow, pinched reality, a one-dimensional world.

A computer program can be judged by a variety of criteria: speed, general usefulness, memory efficiency, programming cleverness, beauty of design, ease of modification, and clarity.

Obviously, the needs of the classroom differ somewhat from the needs of a magazine. "Utility Bill Audit" is an especially useful applications program. Size is always a consideration in magazines. It's of particular importance when trying to fit something useful into the small space available in a subscription advertisement mailing. In these contexts, a program's compactness is of great value. REM statements

would have perhaps doubled its size.

All our published programs, this one included, are documented in the text of an accompanying article. However, when a program contains no particularly novel or complex programming technique, REM comments are omitted. It would serve no meaningful purpose to REMark about the unremarkable. Our readers would quickly tire of repetitive explanations of perfectly obvious FOR/NEXT loops or DATA statements within published programs. Elementary BASIC programming is thoroughly covered in several of our regular columns.

But the essence of this gentleman's complaint about "Utility Bill Audit" is that it makes use of too many GOSUB and GOTO instructions. These instructions interrupt the straightforward execution of a program; they cause it to branch to different places while running. The program works correctly—a person using it wouldn't know whether or not there were "too many" GOSUBs. However, using branch instructions does make it less easy to follow along from one event to the next if you are trying to *read* the program, to understand how it works (or to give it a grade in school).

Some teachers, even some programming languages, forbid the use of the GOTO instruction. The argument is that this kind of branching creates programs which are hard to correct, hard to understand, and hard to modify. They can jump all over the place: events don't occur in a series A B C D, etc. Rather, the structure might look like this: A B D C because between B and C there was a GOSUB which inserted D in the otherwise simple progress through the alphabet.

This argument has some merit. Yet few programmers would willingly give up GOSUB and GOTO; they are among the most powerful and frequently used commands in BASIC. Even fewer are willing to spend the time typing in REM comments except to describe major sec-

tions of a program or clarify obscure code.

There seem to be two distinct programming styles: improvisational and architectural. Schools and many professional programming teams support the architectural style: many formal rules of behavior, extensive diagramming, preplanning, and highly structured, heavily commented programs. The resulting programs take much more time to write, but they communicate their methodology and logic more quickly to another programmer, to a programming committee, or to a teacher attempting to assign them a grade.

By contrast, the improvisational style is favored largely by independent, recreational, or sophisticated creative programmers. This style stresses hands-on, free-form program design. Comments are often replaced with meaningful variable names and GOTO is used with abandon. For these people, what a program does is generally more important than how it's done. They create a list of instructions for the computer to obey, not a list of structures for another programmer or teacher to read and study. The improvising programmer rarely designs his or her program in advance. Instead, communication with the machine is direct and interactive.

COMPUTE! Publications offers both styles of programming in its books and magazines. Some programs are heavily commented and their structure reflects an architecturally strict design. Others are freer, not particularly interesting as *programs* perhaps, but of significant value in the application they offer the user. "Utility Bill Audit" is one of the latter.

Net Worth™

Your Personal

**Its only business is managing your home finances.
No program does it more quickly, more easily, more directly.**

Your Personal Net Worth systematizes the management of your household income, expenses, credit cards and check books — using methods tested for accuracy by Touche Ross, one of the nation's leading accounting firms.

Your Personal Net Worth puts your computer to work, keeps your records straight, including your personal inventory of valuables and stock portfolio, tells you where and how you're spending your money or if you're making a shambles of your budget. And does it all

in less time than it takes you to balance your check book.

Nothing else — no other program at twice the price — makes handling your personal money matters simpler, faster and more direct than **Your Personal Net Worth**.

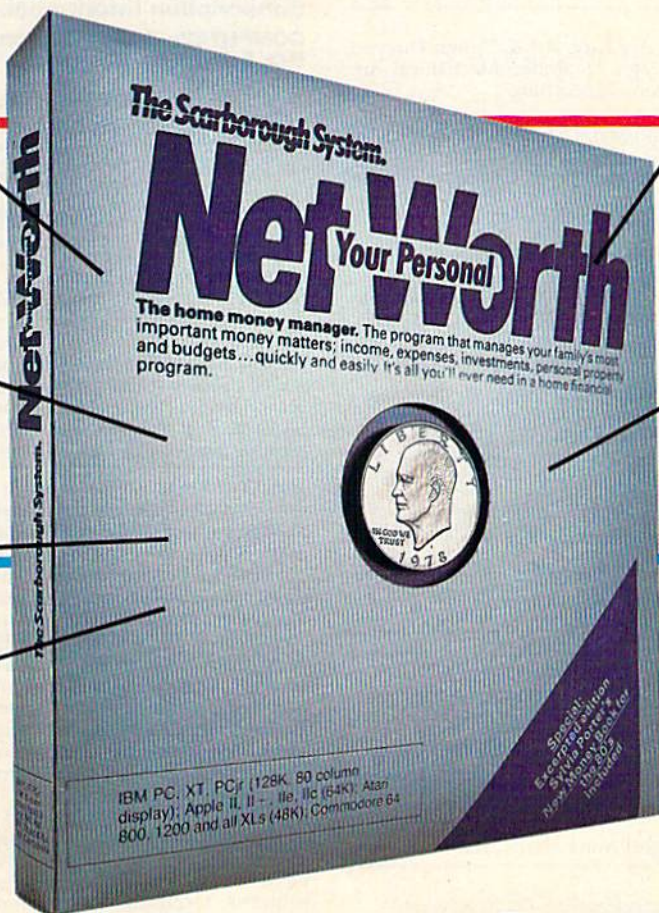
You'll find it at your favorite software retailer in the silver box with the real silver dollar on the front. It could be the single most valuable purchase you'll ever make.

Record all banking and any credit card transactions, reconcile bank statements instantly (up to 10 separate bank accounts can be handled), — print checks, too.

Set up a budget (as many as 350 categories) — and then compare your actual income and expenses to the budget.

Never forget a tax-deductible item. Today or at tax return time.

Display or print every financial report you'll ever need.



Record stock, bond and other investment transactions. Inventory household valuables, collectibles and important papers for insurance and other purposes.

Your Personal Net Worth works fast because it's in machine language. Documentation in plain English is referenced for easy use. "Help" functions on screen at all times.

Available for:

IBM-PC/XT/PCjr (128K)
Apple II + /IIe/IIc (64K)
Commodore 64
Atari (48K)

The Program comes with two disks, one of which has accounts already set up for entry. However, only one disk drive is necessary.

The Scarborough System.

Publisher Gary R. Ingersoll
Editor in Chief Robert C. Lock
Director of Administration Alice S. Wolfe
Senior Editor Richard Mansfield
Managing Editor Kathleen Martinek
Editor Lance Elko
Assistant Editor Todd Heimark
Production Director Tony Roberts

Editors

Tom R. Halfhill, Editor, COMPUTE! Magazine; Stephen Levy, Editor, COMPUTE! Books Division; Gail Cowper, Production Editor; Ottis R. Cowper, Technical Editor; Charles Brannon, Program Editor; Selby Bateman, Features Editor

Assistant Editors

Gregg Keizer, J. Blake Lambert (Books); John Krause, George Miller, Philip Nelson (Technical); Kathy Yakal, Feature Writer; Sharon Darling, Research Assistant (Features), Randall Fosner, Assistant Managing Editor (Books); Mark Tuttle, Submissions Reviewer

Editorial Programmers

Patrick Parrish (Supervisor), Tim Victor, Kevin Mykytyn, Kevin Martin, Rob Terrell

Programming Assistants

David Florance, Susan Doss, David Hensley

Copy Editors

Juanita Lewis, Joan Rouleau, Ann Davies

Proofreaders

Ethel Silver, Dwight Smith, Marty Selby

Administrative Staff

Susan Young, Vicki Jennings, Laura MacFadden, Julia Fleming, Iris Brooks, Jan Kretlow

Production

Irma Swain, Production Manager; Janice Fary, Art & Design Director, Lee Noel, Assistant Editor, Art & Design; De Potter, Mechanical Art Supervisor; Terry Cash, Carole Dunton, Typesetting

Artists

Leslie Jessup, Larry Sullivan, (Publications), Debbie Bray (Books); Harry Blair, Illustrator

Associate Editors

Jim Butterfield (Toronto), Harvey Herman (Greensboro), Fred D'Ignazio (Roanoke)

Circulation

Charles C. Post, Circulation Manager; Patty Jones, Assistant Circulation Manager; Fran Lyons, Single Copy Sales Supervisor; Jill Pope, Fulfillment/Subscription Supervisor

Customer Service

Philippa King, Customer Service Manager; Gail Jones, Dealer Sales Supervisor; Judy Taylor, Customer Service Supervisor; Dealer Sales Staff: Rhonda Savage, Debi Goforth, Liz Krusenstjerna; Customer Service Staff: Betty Atkins, Gayle Benbow, Chris Gordon, Mary Hunt, Chris Patty

Lonnie Arden, Warehouse Manager; Staff: Howard Ayers, Steve Bowman, Larry O'Connor, Sam Parker; Jenna Nash, Mail Room Coordinator.

Data Processing

Leon Stokes, Manager; Chris Cain, Assistant

Accounting

Paul J. Megliola, VP, Finance & Planning; R. Steven Vetter, Director, Finance & Planning; Robert Bean, General Accountant; Karen K. Rogalski, Financial Analyst; Staff: Dale Roberts, Shannon Roesler, Jane Wiggs

Credit

Barry L. Beck, Credit Manager; Staff: Sybil Agee, Anne Ferguson, Pat Fuller, Doris Hall, Joyce Margo, Linda Miller, Mary Waddell

Purchasing

Gregory L. Smith, Purchasing Manager; Anna Harris, Assistant

Promotion

Mindy K. Kutchei, Promotion Manager; Caroline Dark, Assistant

Advertising Sales

Ken Woodard, Director of Advertising Sales; Bonnie Valentino, Assistant Advertising Manager; Patti Stokes, Production Coordinator; Kathleen Hanlon, Sales Assistant

Sales Representatives

Jerry Thompson 415-348-8222
Ed Winchell 213-378-8361
Harry Blair 919-275-9809

Jules E. Thompson, Inc.
National and Canadian Sales Representatives
1290 Howard Avenue, Suite 303
Burlingame, CA 94010

Address all advertising materials to:

Patti Stokes, COMPUTE!'s GAZETTE
324 West Wendover Ave., Suite 200, Greensboro, NC 27408

Sales Offices, The Thompson Company

New England	617-720-1888
Mid-Atlantic	212-772-0933
Southeast	919-275-9809
Midwest	312-726-6047
Texas	713-731-2605
Northwest, Nevada	408-354-5553
Northern CA	415-348-8222 or 408-354-5553
Southern CA	213-378-8361
Arizona	213-378-8361
New Mexico	213-378-8361
Colorado	303-595-9299

COMPUTE! Publications, Inc., publishes

COMPUTE! **COMPUTE! Books** **COMPUTE!'s GAZETTE**

Corporate Office:

324 West Wendover Ave., Suite 200, Greensboro, NC 27408

Mailing Address:

Post Office Box 5406, Greensboro, NC 27403

Distribution Center

500-A Radar Road, Greensboro, NC 27419

Telephone: 919-275-9809

Office Hours: 8:30 AM to 4:30 PM Monday-Friday

Chief Executive Officer Robert C. Lock

President Gary R. Ingersoll

Vice President, Finance & Planning Paul J. Megliola

Executive Assistant Debi Nash

Assistant Anita Roop



Subscription Information

COMPUTE!'s GAZETTE Circulation Dept.
P.O. Box 5406, Greensboro, NC 27403

TOLL FREE
Subscription Order Line
800-334-0868
In NC 919-275-9809

COMPUTE!'s GAZETTE
Subscription Rates

(12 Issue Year): US (one year) \$24. Canada, Mexico and Foreign Surface Mail \$30. Foreign Air Mail \$65.

The COMPUTE!'s GAZETTE subscriber list is made available to carefully screened organizations with a product or service which may be of interest to our readers. If you prefer not to receive such mailings, please send an exact copy of your subscription label to: COMPUTE!'s GAZETTE, P.O. Box 961, Farmingdale, NY 11737. Include a note indicating your preference to receive only your subscription.

Authors of manuscripts warrant that all materials submitted to COMPUTE!'s GAZETTE are original materials with full ownership rights resident in said authors. By submitting articles to COMPUTE!'s GAZETTE, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of COMPUTE! Publications, Inc. No portion of this magazine may be reproduced in any form without written permission from the publisher. Entire contents copyright © 1985, COMPUTE! Publications, Inc. Rights to programs developed and submitted by authors are explained in our author contract. Unsolicited materials not accepted for publication will be returned if author provides a self-addressed, stamped envelope. Where programs are included in an article submission, a tape or disk must accompany the submission. Printed listings are optional, but helpful. Articles should be furnished as typed copy (upper and lowercase, please) with double spacing. Each article page should bear the title of the article, date, and name of the author. COMPUTE! Publications, Inc., assumes no liability for errors in articles or advertisements. Opinions expressed by authors are not necessarily those of COMPUTE! Publications, Inc. COMPUTE! Publications assumes no responsibility for damages, delays, or failure of shipment in connection with authors' offer to make tape or disk copies of programs published herein.

PET, CBM, VIC-20, and Commodore 64 are trademarks of Commodore Business Machines, Inc., and/or Commodore Electronics Limited. Other than as an independent supplier of quality information and services to owners and users of Commodore products, COMPUTE! Publications, Inc., is in no way associated with Commodore Business Machines, Inc., or any of its subsidiaries.

Fleet System 2™

Word processing that *spells* V-A-L-U-E.



Complete word processing with built-in 70,000 word spell checking - Only \$79.95

Up till now, you'd have to spend a minimum of about \$70 to get a good word processor for your Commodore 64™. And if you added a small, *separate* spell checking program, you'd be out well over \$100!

Now there's Fleet System 2! It's two powerful programs in one, and it's perfect for book reports, term papers or full office use.

Fleet System 2 combines the EASIEST and most POWERFUL word processor available with a lightning-fast 70,000 word spelling dictionary — all in one refreshingly EASY TO USE integrated system. Finally, spell checking is now available at your fingertips.

You can even add over 15,000 "custom" words to the built-in 70,000 word dictionary. And at a suggested retail price of \$79.95, Fleet System 2 really spells V-A-L-U-E, and 70,000 other words too!

Fleet System 2 helps people of all ages to learn to *spell correctly* and *write better* too. It's the ONLY full featured word processor that provides you with helpful writing and vocabulary feedback such as: the total number of words in your document, the number of times each word appears, and total number of "unique" words, just to name a few.

Fleet System 2 has every important feature that will help you make child's play

out of the most heavy duty typing tasks. There's Built-in 80 Column Display — so what you see is what you get, Horizontal Scrolling During Typing, Easy Correction and Movement of Text, Page Numbering, Centering, Indenting, Headers and Footers, Math Functions, Search and Replace, Mail Merge, BUILT IN 70,000 word SPELL CHECKING and much, much more!

Ask for Fleet System 2.
Exceptionally Easy. Packed with Power. Perfectly Priced.



Professional Software, Inc., 51 Fremont Street, Needham, MA 02194 (617) 444-5224 Telex: 951579

Fleet System 2™ is a trademark of Professional Software, Inc. — Fleet System 2™ was designed and written by Visiontronics, Ltd. — Commodore 64™ is a trademark of Commodore Electronics Ltd. — Some printers may not support certain Fleet System 2 functions and/or require an interface. Please check with your dealer. — Dealer and Distributor inquiries are invited.

Building A Computer System

I recently received a Commodore 64 as a gift. All I have is the computer. I would like to use it for three things: 1) Writing two books—a family history with genealogy and a church history. Both require extensive indexing and cross-referencing of names and places. 2) Correspondence (I write a lot of letters). 3) Keeping a set of books for a small business.

I am not inclined to write programs or play games, but would like a simple approach to keeping personal and household records.

Dan O. Harvill

In addition to the 64, you'll need some hardware. A computer by itself isn't especially useful. Computer memory is volatile, which means when you turn your 64 off, all the information in memory is lost. The first thing you should purchase is some sort of mass storage device—a tape or disk drive—so you can save programs and files for later use. For your purposes—accounting and recordkeeping—a disk drive would be better, although you could get by with a cassette drive. A printer is essential, too, if you want to print your books and letters.

You have definite ideas about how you'll use the 64, so the hardware you purchase will depend on the software you decide on.

You don't want to learn programming, and you probably don't want to pay the high expense of hiring someone to write custom genealogy and church history software. That leaves commercial software.

A database management program will cross-reference and index both the family tree and the church history. Think of it as a fast electronic card file. You tell the computer what categories to use in the database (for a family tree, you might pick first and last name; dates of birth, marriage, and death; generation number; father, mother, spouse, and children; and so on). You then type in the information and save it to tape or disk. The database management program then alphabetizes or sorts by category. You can search for specific entries, and organize the information in different ways, depend-

ing on the capabilities of the software.

To write letters and books, you'll need word processing software. If you buy the right word processor, you can merge information from the database into your manuscripts. This might seem like a frill, until you contemplate the extra work of first typing the data into the database and then retyping it into your word processor. There are several packages available which contain both a word processor and database (see "The Move Toward Integrated Software" in the January 1985 GAZETTE).

And there are several packages for the 64 that can handle your accounting. In this case, compatibility with the other two programs is probably not necessary.

How do you decide on the hardware and software you need? That's up to you. We can't recommend specific items; each has its strengths and weaknesses. If you're far from a Commodore dealer, you can write directly to manufacturers. Or read the ads and reviews in computer magazines. User groups are often helpful sources of information, too.

The Best Tape Is Also Less Expensive

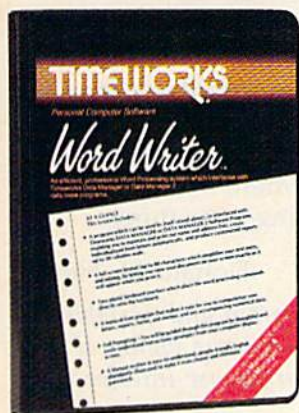
I'm stationed in the Phillipines and just about everything having to do with computers is expensive. I'm looking for a good, inexpensive tape for saving computer programs. I do a lot of audio recording and like to use CrO₂ tape. Will chromium oxide tape (high position) damage my Datassette?

G.O. Starr

It won't damage your cassette drive, but you won't get the best results from it either.

On audio equipment, chromium tape records and plays music better than ordinary ferric oxide tape. But to record on it, the magnetic signal put out by the recording heads has to be stronger, which is why many cassette players have two switches—one for ferric, one for chromium. Your Datassette does not have a switch to boost the signal, so you

IF YOU CAN FIND A BETTER WORD PROCESSOR OR DATA BASE SYSTEM WE'LL BUY IT FOR YOU.



Word Writer

This menu-driven system includes:

A program which can be used by itself (stand-alone), or interfaced with Timeworks' Data Manager or Data Manager 2, enabling you to maintain and print out name and address lists, create individualized form letters automatically, and produce customized reports up to 20 columns wide, which can be incorporated into any text produced by the Word Writer.

Two plastic keyboard overlays which place the word processing commands directly onto the keyboard.

A full screen format (up to 80 characters) which simplifies your text entry and editing.

All the essential features—plus some exclusive Timeworks extras—making this system completely functional for most home & business requirements.

Data Manager 2

This system includes:

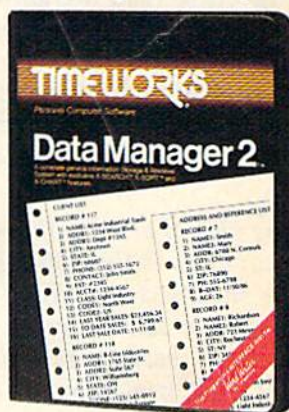
A menu-driven program that easily lets you store information on a wide variety of subjects—from general name and address lists, to research data. This program will also calculate and store any corresponding numerical data.

Quick access to important information. Items can be easily retrieved and printed by category, name, index code, date range, amount range, or any category of information stored in the system.

Outrageous offer? Not really. For your Commodore 64, we're putting our money where our mouth is, because the Timeworks Word Writer and Timeworks Data Manager 2 are so complete—so extremely easy to use, we think nothing beats them at any price. (Our suggested retail prices are: \$49.95 for Word Writer. \$49.95 for Data Manager 2.)

Timeworks exclusive X-Search™, X-Sort™ and X-Chart™ features allow you to easily cross-search any of the categories. Or arrange your stored items in increasing or decreasing order, alphabetically, numerically or by date. Break down statistical information by up to ten indexed categories of your choice—and graphically review your results.

Arithmetic calculation of your mathematical data is possible, allowing you to perform Payroll calculation, cost estimates and more. Data Manager 2 also produces the Sum, Average and Standard Deviation of statistical data entered into the system, along with Frequency Charts.



When interfaced together, these programs:

Generate customized data reports, which can be incorporated into any written text produced.

Individually address and print form letters automatically.

Print your name and address file onto standard mailing labels.

Transfer and print text information onto labels and tags.

Calculated numerical data from column to column, giving these programs spread-sheet capabilities.

So, if you can find anything better, simply send us your Word Writer or your Data Manager 2, your paid receipt, and the name of the program you want, along with your check or money order for any price difference. If it's available, we'll buy it for you.**

Now at your favorite dealer. Or contact Timeworks, Inc., P.O. Box 321, Deerfield, IL 60015. Phone 312-948-9200.



SOFTWARE WITH SUBSTANCE.



**Now for the small print. Offer applies to Commodore only, with maximum suggested retail prices of \$125.00 each for any exchanged program. Offer expires 45 days after date of your purchase.

*Registered Trademark of Commodore Computer Systems ©1983 Timeworks, Inc. All rights reserved.

may have problems using chromium tape with your system.

Not only is ferric oxide tape better for use with a computer, it's also less expensive. Buy the shortest tapes you can find; long tapes (90 or 120 minutes) are often thinner and can lose tension, leading to slippage. Also, to maintain recording quality you should regularly clean and demagnetize the heads on your Datassette.

A 16384K Expander For The VIC And 64?

I recently read a couple of articles describing a new chip called the 65816. Apparently this chip has enormous potential and might also be instantly interchangeable with the 6502. Do you have any further information? What will it mean for users of Commodore, Atari, and Apple?

Bill Pittman

The chip that runs the Apple, Atari, and the VIC-20 computers is the 6502. The 64 uses the 6510, from the same 65xx family of microprocessors. The 65xx chips can address up to 64K (65,536) of memory and no more, because they have a 16-bit address bus.

This new chip has a 24-bit address bus, which lets it access 256 times as many memory locations—16384K (16 megabytes). It's the same size as the 6502, and pin-compatible. The machine language instruction set is upward-compatible from the 65xx processors. The 65xx ML opcodes are all there, and there are more (including an extra register, another status flag, and useful instructions like PHY and TXY).

It runs in two modes: 8-bit (6502-compatible) and 16-bit, and you can toggle back and forth between the two.

Several readers have written for information about replacing the 65xx chip in their VIC or 64 with the 65816. Contrary to some published rumors and speculation, you can't add extra memory that easily. You'd have to add another timing clock (chip) and redesign the circuit board to accommodate the extra memory and support chips. In short, you'd have to completely revamp the internal layout of the computer, a job best left to engineers. A hard disk drive would almost be a necessity—16 megabytes is the equivalent of nearly 100 floppy disks.

If computer companies decide to use the 65816 in their new machines, they could offer memory expandability (up to 16 megabytes) and complete compatibility with Apple, Atari, or Commodore. So far, Commodore has not announced any plans to build a computer around the 65816. They're designing the Amiga around the 68000, the same chip used in the Macintosh. Apple is said to be thinking about putting the 65816 in a new Apple II compatible.

Managing Memory And Dangerous POKES

I have a problem with a program which contains six sprites. It loads and runs once. On the second run I get either a strange line number which bombs the program or I lose the sprite data lines, causing an OUT OF DATA error.

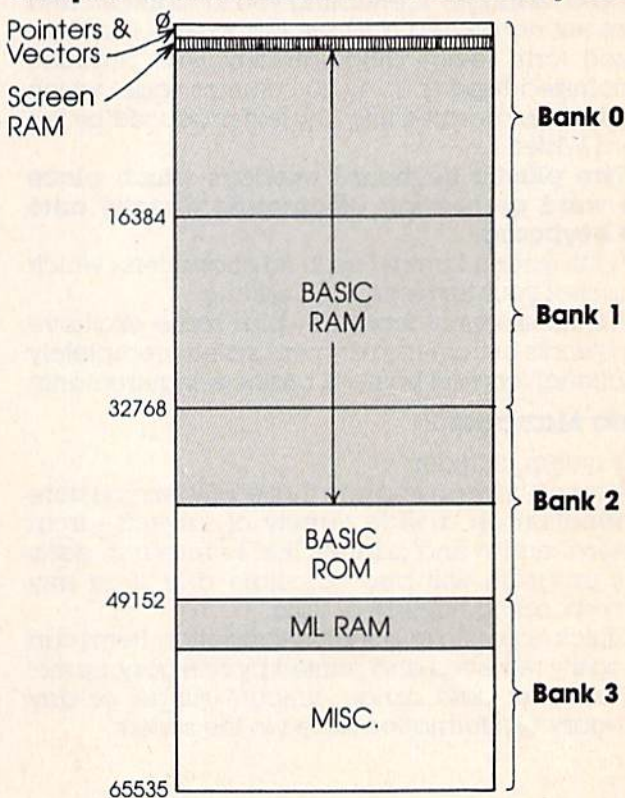
I believe the variables are overwriting the sprite area. I have 29923 bytes free before running, 29633 free after running. After reading many reference books, I've gotten ideas about moving, hiding, raising, and lowering memory, and I've come to the point where I can't see the forest for the trees. I'm missing something somewhere.

Donald M. Hewitt

Sprites need memory. Your program and variables also need memory. Although you have plenty of free memory, it sounds like your sprites are interfering with program memory.

In general terms, the 64's memory runs from locations 0 to 65535 and is divided into these sections:

Simple Commodore 64 Memory Map

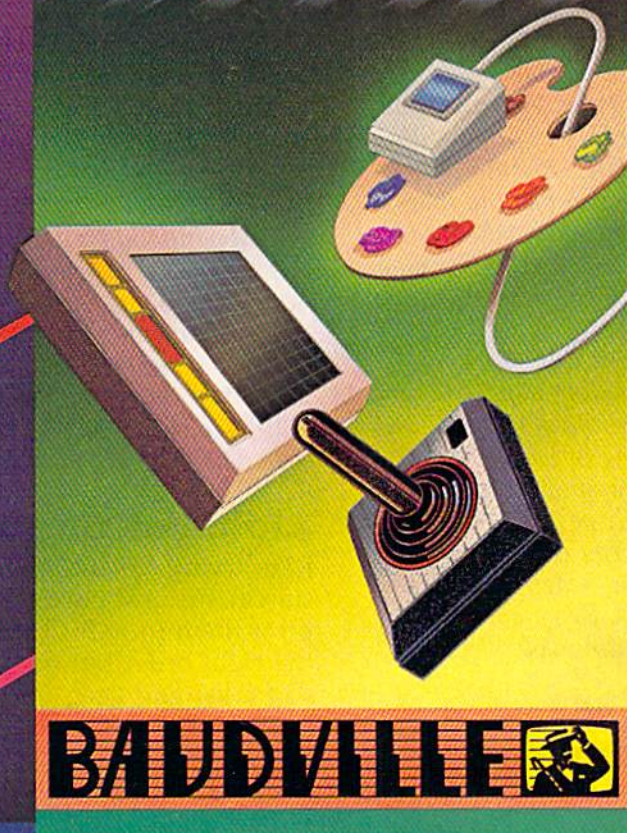


0-1023	stack, pointers, and vectors
1024-2039	screen memory
2040-2047	sprite pointers
2048-40959	free memory for BASIC programs and variables
40960-49151	BASIC interpreter
49152-53247	free memory for machine language programs
53248-65535	miscellaneous (video, sound, color memory, Kernal)

Apple
Commodore

Now You Need...

ILLUSTRATOR
BLAZING
PADDLES



**The All-In-One
Illustrator**

It draws, paints & prints your high resolution illustrations with ease. Works with any standard input device, including touch tablets, joy sticks, light pens, mice & professional graphics tablets.



**Sophisticated
Features**

State-of-the-Art input technology, color mixing to create over 200 textured hues, painting with a variety of brush strokes, air-brushing, inserting ovals, lines, rectangles. Zoom allows pixel editing while viewing the results at full scale. Text fonts and pre-drawn shapes are included and may be added at any time. A printer dump for most dot matrix printers is included.

See Your Dealer...

or for direct orders enclose
\$49.95 Apple Version
\$34.95 Commodore Version
plus \$3.00 for shipping & handling.
Mastercard and Visa accepted.

616/957-3036



Productive Fun

Includes all the artistic tools needed to create striking computer art. So versatile that young children are able to use it like a coloring book, yet sophisticated enough for a computer artist to use. Perfect for Home, Business, Education, and the Art. The possibilities are endless...

APPLE is a registered trademark of APPLE COMPUTER
COMMODORE is a registered trademark of COMMODORE COMPUTER

BAUDVILLE

Baudville, 1001 Medical Park Dr. S.E.,
Grand Rapids, Michigan 49506

The shaded areas indicate free memory you can use for your programs.

BASIC programs are stored in memory starting at 2048. To find out where the program ends, type `PRINTPEEK(45)+256*PEEK(46)`. When you run a program, the variables are stored just past the end of the program. To find out where the variables and arrays end, `PRINTPEEK(49)+256*PEEK(50)` after running the program.

If you use these two formulas, you'll probably find that your sprite definitions are being put into memory already used by your program. POKEing sprite data into program memory scrambles part of the program, making it crash the second time around.

You have two choices: Move the sprites somewhere else, or change the start of BASIC to somewhere above the sprite definitions.

The VIC-II chip controls the video signal which draws the screen characters and sprites. It can access any memory location within a 16K block or bank of memory. These banks are labeled 0-3 on the abbreviated memory map above. When you turn on the 64, the VIC-II chip takes its information from bank 0. It's possible to switch to other blocks by POKEing to 56576, but you also have to move screen memory and character memory, which means copying character ROM down to RAM. Thus, moving sprite definitions to another 16K bank is rather complicated.

It's much simpler to move BASIC up, completely out of bank 0. Before loading your program, `POKE642,64:SYS58260` to move the start of BASIC to `64*256 (16384)`, the beginning of bank 1. You'll still have 24K for your program, and it won't interfere with the sprites. There will be 14K (from 2048 to 16383) for the VIC-II chip. You can use this memory for an 8K hi-res screen, redefined characters, or up to 224 sprite shapes. Remember to use this POKE and SYS before loading your BASIC program.

The Eddie Operating System

I wrote this program for the 64 using Micromon and *COMPUTE!'s Mapping The 64*. It changes the all-too-familiar READY. prompt to EDDIE!, copying BASIC ROM to RAM at the same address and then changing the pointer at location 1 to recognize the RAM. If you press RUN/STOP-RESTORE, READY will come back, but you can reenact the customized prompt with `POKE1,PEEK(1)AND254`.

```
10 FORJ=40960TO49151:POKEJ,PEEK(J):NEXT
20 POKE1,PEEK(1)AND254
30 FORJ=41848TO41853:READL$:POKEJ,ASC(L$)
: NEXT
40 DATAE,D,D,I,E,!
```

Edward Padin

Readers who want to substitute up to six letters in place of READY can change the DATA statement in line 40 (separate the letters with commas). The program takes 30-40 seconds to run.

This is a good example of how to use the RAM underneath ROM. The BASIC interpreter is found in Read Only Memory (ROM) at locations \$A000-BFFF (40960-49151). At the same locations is 8K of Random Access Memory (RAM), which is usually not used by the computer. BASIC can access one but not both of the 8K blocks of memory at any one time. ROM is permanent, but RAM is changeable. When you PEEK within this range, you get the numbers in ROM, but POKEing puts numbers into the RAM "underneath" ROM. Line 10 seems to PEEK a location and POKE the same number right back, but really copies BASIC down to RAM, where it can be altered.

Line 20 flips a bit in location 1 to make the computer look at the RAM underneath, rather than BASIC ROM. This technique is called bank switching, because one 8K bank is switched out, another switched in. An exact copy of BASIC has just been put there, so everything works the same, until some new values are POKEd into the area where the READY prompt is stored.

Machine language programmers sometimes use this technique to rewrite BASIC to fit their needs. And if you don't need BASIC at all, this technique gives you another 8K of memory for ML programming.

For another example of changing BASIC messages, run the above program and then `POKE41654,72:PRINT4/0`. You'll see an error message, DIVISION BY HERO (instead of ZERO).

Alphabetizing A List

I am trying to take seven words from DATA statements and put them into an array so I can print them in A-B-C order. I get the first word in the right order but not the other six. How do you sort a list and keep the information intact?

Kurt Wells

You're on the right track because you're using an array and have the first word in the correct place.

A one-dimensional string array is like a numbered list of words. String arrays make it much easier to alphabetize. Because each item has a number, you can use a FOR-NEXT loop to search through the list. To sort, you compare the first word to the second, trade them if they're out of order, compare item two to item three, trade if necessary, and so on until you reach the last entry on the list. If the program loops through the array once, one word will be in the correct place. If you loop twice, the second entry will be in the right place.

Less-than, greater-than, and equals are commonly used to compare numbers (for example, `IF SC>HS THEN PRINT "NEW HIGH SCORE!"`). But

**EXPAND YOUR COMMODORE 64
... WITH PERIPHERALS FROM MPP**

MPP 1064 MODEM

with VIP™ Terminal By Softlaw Corp.



- For Commodore 64 Computer
- Auto Answer/Auto Dial
- Plugs into user port
- Free CompuServe™ DemoPak
- Includes VIP™ Smart Terminal
- 1 Year Warranty

MPP
MICROBITS PERIPHERAL PRODUCTS, INC.

225 W. Third Street/Albany, Oregon 97321

Orders Only 1-800-624-7532 Customer Service (503) 967-9075

VIP™ Copyright 1984, Softlaw Corporation

Commodore 64 is a registered trademark of Commodore Electronics

they can also be used to compare strings. The computer decides if a word is "less than" another by comparing the ASCII values. The letter A is less than B, which in turn is less than C. An appendix at the end of the User's Guide contains a complete list of Commodore ASCII codes.

Here's a program that alphabetizes a list of five strings:

```
10 TN=5:{3 SPACES}REM TOTAL NUMBER OF ITEMS
20 DIMA$(TN)
30 FORJ=1TO5:READA$(J):NEXT
40 REM ALPHABETIZE
50 FORJ=TN-1TO1STEP-1
60 FORK=1TOJ
70 IFA$(K)<A$(K+1)THEN90
80 TEMP$=A$(K):A$(K)=A$(K+1):A$(K+1)=TEMP$
90 NEXTK,J
100 REM PRINT THE ALPHABETIZED LIST
110 PRINTCHR$(147)
120 FORJ=1TO5:PRINTA$(J):NEXT
130 DATAOF,STRINGS,ARRANGED,LIST,ALPHABETICALLY
```

Lines 10-30 set up the array, DIMensioning to a size of five and READing the words from the DATA statement. Lines 50-90 alphabetize the list and line 120 prints the list in order.

The outside loop uses the variable J and starts in line 50. It counts backwards (STEP -1) from one less than the array size (TN - 1) to 1. So variable J begins at 4 and counts down to 1. The inside loop uses K and counts forward to J: 1 to 4, then 1 to 3, 1 to 2, and finally 1 to 1. Line 70 compares A\$(K) to A\$(K+1), the next string on the list. If word K is less than word K+1, they're in order and the program skips to line 90. If not, line 80 swaps them.

The strings start out in this order:

```
A$(1) OF
A$(2) STRINGS
A$(3) ARRANGED
A$(4) LIST
A$(5) ALPHABETICALLY
```

After the first pass (J=4), STRINGS drops to position 5, but the other four words are still out of order. The second pass (J=3) puts OF in its proper place, and so on.

This algorithm is called a bubble sort. One advantage of bubble sorting is that it's fairly simple and straightforward. The major disadvantage is its inefficiency; it works very slowly with large lists. To bubble sort five items requires ten comparisons, but multiply the list size by 20 (100 items) and the number of comparisons increases by a factor of 495 (4950).

There are faster methods to alphabetize, but they're more complicated to program.

No BBS For VIC?

In the December issue, you published the "C/G Bulletin Board" for the 64 but not for the VIC-20.

Why? I have 35K memory for my VIC, which would be plenty of memory for the bulletin board. I don't understand why you bothered to publish C/G Term for the VIC if you had no intention of giving VIC users a bulletin board.

Harry C. Phillips

There were several considerations in our decision to publish the bulletin board for the 64 only. Most important, the Commodore 1650 Automodem offers auto-dial, but not auto-answer for the VIC, a must for operating a bulletin board. You'd have to sit by the phone, ready to answer calls to the BBS. You can use the auto-answer feature with the 64. The VICmodem has no auto-answer or auto-dial feature, making it inappropriate for a bulletin board.

Also, the program length was unwieldy enough for the 64—it took a lot of magazine space in two issues (December and January). A VIC version would have required just as many pages (leaving less room for columns, games, and programs).

With 35K, you certainly would have enough memory, but VIC owners with that much memory are an exception rather than a rule. The 22-column VIC screen also makes the reading of lengthy text (what you see most often as a BBS operator) very cumbersome.

The VIC version of "C/G Term" allows VIC owners to communicate with the "C/G BBS" and with either 64 or VIC owners who have "C/G Term."

Which Is More Random?

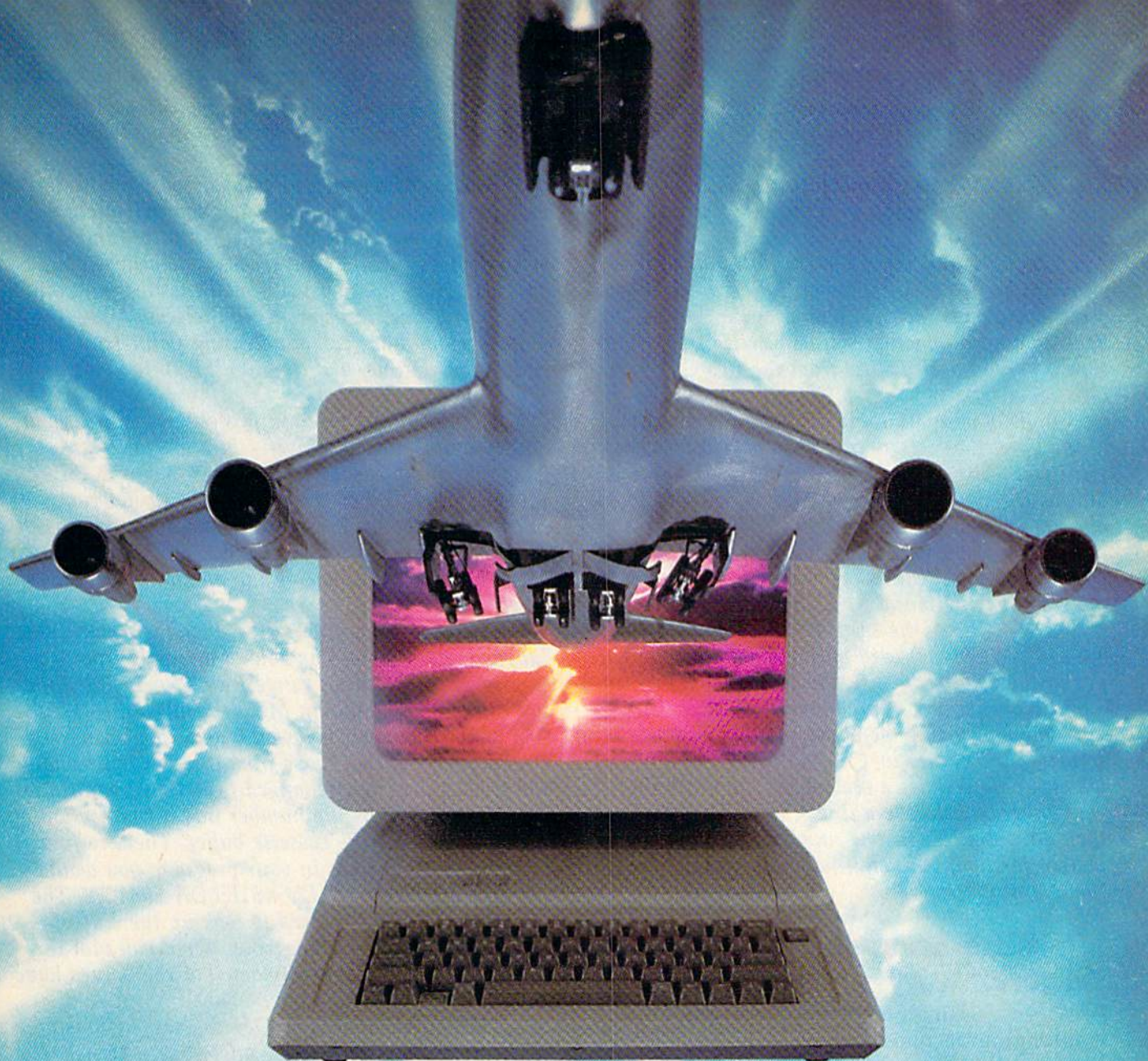
It has been demonstrated to me that INT(RND(1)*X) is inferior to INT(RND(0)*X) in generating a true sequence of random numbers. The programs you publish use the first formula. In light of this information, is there any reason to continue to do so?

Rob Landeros

The idea that RND(0) yields more randomly distributed numbers is mistaken. The argument for RND(0) usually goes something like this: Turn on your computer and type PRINTRND(1) and write down the number. Turn the computer off and then on and do it again. You'll get the same number every time. In fact, if you print a series of RND(1)s, the sequence will always be the same. Thus, RND(1) is not truly random. With RND(0), the numbers seem to be more random.

We have seen published "proofs" similar to the argument above. But RND(0) has some serious flaws. Enter the following program (for the 64 only):

```
10 PRINT"{CLR}":POKE53281,1
20 FORJ=1TO1000:K=INT(RND(0)*1000):POKE55296+K,6:POKE1024+K,160:NEXT
30 GOTO30
```

ALL AIRLINES DEPART FROM THIS TERMINAL.

**Presenting TravelshopperSM
... new from CompuServe
and TWA.**

Now you can save time and money by getting information and reservations on virtually any flight on any airline—worldwide—from one source. It's TWA's new Travelshopper, available now through CompuServe's Information Service.

With Travelshopper, you can scan flight availabilities, discover airfare bargains and order tickets... on your own personal computer... at home or in the office.

You also receive automatic membership in TWA's Frequent Flight BonusSM program. And you can build bonus points by staying at Marriott and Hilton hotels and by using Hertz Rent-A-Car.

Besides Travelshopper, CompuServe offers an ever-growing list of other travel-oriented on-line services.

The Official Airline Guide Electronic Edition lists direct and connecting flight schedules for over 700 airlines worldwide plus over 500,000 North American fares.

Firstworld Travel offers worldwide travel advice and service.

Discover Orlando provides complete prices, hours and features on all of Central Florida's attractions and accommodations.

West Coast Travel offers travel information for the western states.

Pan Am's Travel Guide contains up-to-date information on immigration

and health requirements for most foreign countries.

And TravelVision[®] provides complete automotive information, including road maps and an expert, personalized routing service.

Let your travel plans really take off. Use Travelshopper and lots, lots more from CompuServe.

To buy a CompuServe Starter Kit, see your nearest computer dealer. To receive our informative brochure, or to order direct, call or write:

CompuServe

P.O. Box 20212, 5000 Arlington Centre Blvd.,
Columbus, Ohio 43220

1-800-848-8199

In Ohio, Call 1-614-457-0802

Line 20 generates 1000 random numbers ranging from 0 to 999 and then POKES a reverse space to the corresponding screen location. You can see a definite pattern with RND(0). If you change the RND(0) to RND(1), there is no such pattern. RND(1) gives you a wider range of numbers, distributed more randomly.

The RND function is not truly random, it only seems to be. It takes a number (called a seed), performs some mathematical operations on it, and gives back another number. If you use RND(0), the function is seeded with values from the two CIA Time-Of-Day clocks.

RND(0) is undesirable for several reasons. One of the CIA clocks starts at zero, and doesn't change until you write to it. So some of the seed values are always the same. To make things worse, the clocks operate in Binary Coded Decimal, which means they count from 0-99 instead of 0-255, further limiting the seed values. With all of these limits on seed values, the distribution of RND(0) numbers is limited.

RND(1) takes the seed from memory locations 139-143. When you turn on the computer, the values in these locations are always the same, which is why RND(1) seems so predictable.

The best way to generate random numbers is to scramble the values in 139-143 using the jiffy clock, which ticks 60 times a second. At the beginning of your program, include a line `X=RND(-TI)`. From then on, use RND(1). The numbers won't be completely random, but you'll have the closest thing to random numbers.

Machine Language Trigonometry

I've been working on some high-resolution graphing in machine language, and have come across a problem. How do you calculate trigonometrical functions like sine and cosine in machine language? I know these locations perform the functions on a VIC-20:

COS	\$E261
SIN	\$E268
TAN	\$E2B1
ATN	\$E30B

How do you call these functions? For example, how could I find the sine of 30 degrees?

David Reid

When you're stuck on a programming problem, it sometimes helps to step back and think about it from a distance. Very often, the best method of doing something in BASIC is also the best method in ML—but not in this case.

To find the sine of 30 degrees, you could JSR (Jump to SubRoutine) to \$E268. This is the address on the VIC-20; on a 64 the equivalent routines are all three bytes higher—sine would be at \$E26B. The routine acts on the number in the Floating Point

Accumulator, locations \$61-66, and stores the result there. But it expects you to describe the angle in radians, not degrees. And the answer is almost always a floating point fraction.

To change degrees to radians, you have to divide by 180 and multiply by π (approximately 3.14). It becomes quite complicated to find the sine of 30 degrees in ML: Convert 30 to floating point, convert 180 to floating point, call the floating point division routine, transfer π to the second floating point accumulator, call the floating point multiplication routine, and (finally) JSR to the sine function.

The result is a fraction in floating point format, which is not especially useful in a machine language program. Also, because you're using BASIC routines, this part of your program will not run much faster than a BASIC program. You might as well do the calculations in BASIC, reserving machine language for plotting the points on the hi-res screen.

There's a good alternative, though: a machine language data table. The sine of an angle from 0 to 90 degrees will always range from 0 to 1. Fractions are difficult to handle in ML, so we'll multiply by 255 to get a number between 0 and 255. Write a BASIC program that loops from 0 to 90, figures out the sine of the angle (changed to radians), multiplies by 255, and POKES the number into a free section of memory, perhaps the cassette buffer. Then, to find the sine of 30 degrees in your program, you would use two instructions: `LDY #31E:LDA $033C,Y`. The Y register is an offset used to look up the sine of any angle from 0 to 90 degrees. When you plot the points on the screen, remember that the values have been multiplied by 255.

Here's one more idea: Degrees and radians are arbitrary ways of measuring angles, so why not make up your own system? 256 is a good machine language number; divide a circle into 256 equal parts and invent a new system of trigonometry based on computer angles—it could greatly simplify things.

Replacing Old 1525 Ribbons

In the past you have published information about parts for the 1520 and MPS-801.

I have found another tip for those of us with Commodore printers. Radio Shack sells replacement ribbons that fit the 1515/1525 printer, catalog #26-1424 (for the DMP-100 printer).

Edward Shockley

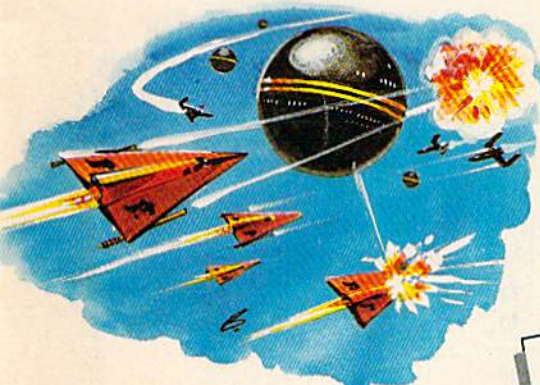
Thanks for the tip. Although Commodore manufactures its own chips and computers, they buy their printers and some other peripherals from other companies. These companies are willing to customize the printer's character set and operating system, but tend to put standard parts (like ribbons)

Get more out of your Commodore with

COMPUTE!'s GAZETTE

For Owners And Users Of Commodore VIC-20™ And 64™ Personal Computers

More fun

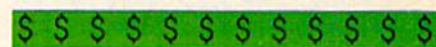


Martian Prisoner, The Viper, Skydiver, Snake Escape, Demon Star, Cyclon Zap, and Oil Tycoon are just a few of the ready-to-run games you'll find exclusively in *COMPUTE!'s Gazette* each month. Just type in the programs and watch your screen explode with colorful new computer game excitement.

Children will learn and develop new skills with States & Capitals Tutor, Wordmatch, Munchmath, Wordspell, Connect the Dots, Aardvark Attack, and Alfabug. Computing for Kids, a regular monthly feature, will uncover new ways to involve your children in computing.



Quickfind, Word Hunt, Disk Menu, VIC Timepiece, The Automatic Proofreader and more.



More buying guidance

You'll profit from comprehensive reviews of everything from data-quality cassette tapes to software to graphics plotters and modems. Virtually anything that's compatible with your Commodore is reported on in *COMPUTE!'s Gazette*. With this kind of expert help, every computer purchase you make can be the right one!



Order now

All you do is mail the postpaid card bound into this issue. But don't delay! Subscribe now to start receiving every issue of *COMPUTE!'s Gazette*.

For Faster Service
Call Toll-Free
1-800-334-0868

More challenge

Ready to tackle more advanced projects? In *COMPUTE!'s Gazette*, you'll learn how to use tape and disk files, how to program the function keys, writing transportable BASIC, how to make custom graphics characters, new ways to enliven programs with sound, one-touch commands for the 64, how to use machine language, speeding up the VIC-20—and much more!



More programs

Programs to help you balance your checkbook, store your addresses, keep tax records, manage your personal business. You can create your own programs and games, improve your word processing, spreadsheets, and data base management, load and run faster with 64 Searcher, VIC/64 Program Lifesaver,

into the hardware, which is convenient for both the printer manufacturer and the customer.

The Mysteries Of AND And OR

I see a lot of ANDs and ORs in your magazine that I don't understand. Even after studying the *Programmer's Reference Guide* and many books and magazines, I have not found an explanation. I understand such lines as this:

```
10 IF A=24 AND B=29 THEN 400
20 IF C=40 OR C=52 THEN 400
```

However, in the following lines, the ANDs and ORs are incomprehensible to me.

```
10 POKE 53265,PEEK(53265)AND223
20 POKE 53265,PEEK(53265)OR32
```

Ray Norton

Mathematical functions like adding, subtracting, or multiplying take two numbers and combine them according to certain rules to form a third number. The rules are constant, and therefore can be converted to tables (like the times tables we learned in elementary school).

AND, OR, and NOT are logical functions which, like math functions, can be expressed in truth tables. For example:

```
true AND true = true
true AND false = false
false AND true = false
false AND false = false
```

The statement (A AND B) will be true if and only if A is true and B is true. If either one is false, the result is false. IF A=24 AND B=29 THEN 400 is an example of this type of AND.

But computers can't handle philosophical concepts like truth and falsity. So, within a Commodore computer, 0 (off) bits represent false and 1 (on) bits are true. This is sometimes called a bitwise AND (because it operates on on/off bits rather than true/false statements). Ask your computer to PRINT72AND45. The answer should be 8, as you can see when you convert the numbers to binary:

```
      01001000  72  (64+8)
AND  00101101  45  (32+8+4+1)
-----
      00001000   8
```

The result contains a 1 only in the position where both numbers have a 1. If you prefer to think of true and false, convert 72 to FTFFTFFF instead of 01001000.

The logical OR operation is true if either statement (or both) is true. Drawing a truth table shows that the only way to get false is if both statements are false. A bitwise OR operates on individual bits:

```
      01001000  72
OR   00101101  45
-----
      01101101 109
```


If a bit in either number is turned on (or true), the corresponding bit in the result is on.

The third logical operator, NOT, makes true statements false, and vice versa. Because of the way numbers are stored in memory, a bitwise NOT adds one and changes the sign. PRINTNOT5 and the screen displays -6.

You can AND, OR, and NOT numbers from -32768 to 32767.

The examples you gave use AND and OR to turn one bit on or off in a register that determines whether or not the 64 is in high-resolution mode. Normally, the location 53265 contains the number 27. POKE 53265,PEEK(53265)OR32 turns on bit 5 (the sixth bit from the right). POKE 53265,PEEK(53265)AND223 turns it off.

Programmers often refer to this use of AND as "masking" a byte. The value is selected carefully—placing 1 bit where no change is wanted and 0 bits in positions to be zeroed. This is similar to a painter sticking masking tape to areas that won't be painted.

BASIC evaluates a line like IF A=32 AND B=29 THEN 100 by assigning a value of 0 (false) or -1 (equivalent to NOT 0, or true). You can see how this works by typing A=32:PRINT(A=32). The screen should say -1, meaning (A=32) is true. 



PASCAL

for the Commodore 64

kyan pascal is a full implementation. With a single disk drive and C64, you can learn Pascal and develop sophisticated programs.

kyan pascal is perfect for classroom or home use. It's Menu-Driven, User-Friendly operating environment helps students learn quickly and lets advanced programmers develop programs 4 to 40 times faster than Commodore Basic.

kyan pascal features:

- Full Screen Editor with Powerful Text Editing Functions.
- MERGE and Other Convenient File Management Functions.
- Fully Resident Software to Eliminate Disk Swapping.
- HELP Screens to Speed Learning.
- Stand-Alone Runtime Environment.
- AND, A Comprehensive Tutorial Manual with Sample Programs.

15 DAY TRIAL

Try *kyan pascal*. If you are not completely satisfied, return diskette and manual in 15 days for a full refund.

kyan pascal with tutorial manual **\$49.95**

(Add \$4.50/copy for postage and handling, \$9.50 outside North America. California residents add 6.5% sales tax.)

Call: (415) 775-2923 Send Check/Money Order to:

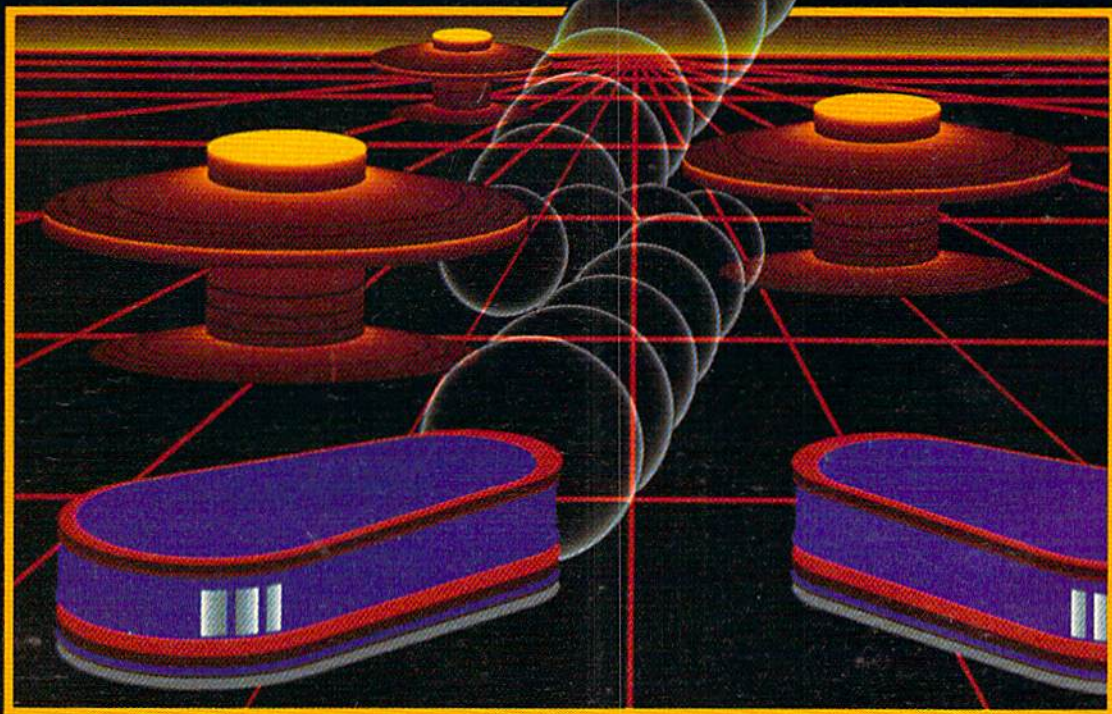



Accepted

kyan software, Dept. B
1850 Union St., Ste. 183
San Francisco, CA 94123

TAKE A BREAK!

For
Commodore 64[™]
Computers



WITH NIGHT MISSION **PINBALL**

You deserve the best. You've earned it. Now reward yourself with a session of **Night Mission PINBALL**, the most realistic and challenging arcade simulation ever conceived! ■ Stunning graphics and dazzling sound effects put **Night Mission PINBALL** in a class by itself. Game features: multi-ball and multi-player capabilities, ten different professionally designed levels of play, and an editor that lets you create *your own* custom modes. ■ So take a break with **Night Mission PINBALL** from SubLOGIC. Winner of *Electronic Games* magazine's 1983 Arcade Award for Best Computer Audio/Visual Effects.



See your dealer . . .

or write or call for more information.

Order Line: 800 / 637-4983

subLOGIC
Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995

Lance Elko, Editor

Just when the doomsayers were looking like soothsayers, the home computer industry received a terrific boost from the two remaining "low end" manufacturers, Commodore and Atari, at the Winter CES. The new micros of 1985 redefine the market by bridging the gap between "personal" office computers and home computers.

A giant leap forward is what some observers called this year's Winter Consumer Electronics Show. Unlike the trade shows of the past two years, this CES, held January in Las Vegas, showcased some remarkable new personal computer technology. Industry watchers had been anxiously awaiting new machines. Surely, it was hoped, Commodore would offer some significant hardware, something more promising than the Plus/4 and the 16. And what of Jack Tramiel, founder of Commodore, now head of Atari? Would he deliver? The recent slump had victimized dozens of hardware and software companies, and contributed to the demise of Coleco's Adam. It could not continue.

The Winter Consumer Electronics Show

CES

New Life In The Home



Illustration by Lee Noel

Computer Market

Driving from the Las Vegas airport into town, it became obvious that this CES would be interesting. Along the way were billboards announcing that we were in "Atari country." And at Commodore's press conference on the opening night, press kits flashing "Bad News for IBM and Apple" were distributed. Despite the tendency towards the pie-in-the-sky advertising hype of many companies in this market, the "bad news" slogans and the swaggering "watch out—we're here" attitude from both Commodore

and Atari may not miss the mark by much. The new machines represent a major step in changing the market and in significantly upgrading the way we compute.

Commodore announced two new machines, the 128 Personal Computer—externally expandable to 512K—and the portable Commodore LCD. Although Commodore would not announce prices for the new machines, Frank Leonardi, new vice president of marketing, said that the 128 would probably be less than \$300 and the LCD less

than \$600. Commodore expects to release the 128 in April or May, and the LCD about one month later.

The 128, contrary to earlier reports that it was simply a 64 with an extra 64K of RAM, is being positioned by Commodore as three computers in one: a 64, a 128 with 80-columns and RGB (Red, Green, Blue—so named because it isolates the primary color signals, providing a much sharper picture) output, and a CP/M machine. With three microprocessors—a 6510 (same as the 64), an 8502 chip,

What Is CP/M?

Charles Brannon, Program Editor

CP/M has been available for the 64 for a while now, but many people still don't know what it is or what it does. Commodore 64 CP/M consists of a disk and a plug-in cartridge. The disk contains the actual CP/M software; the cartridge contains a Z80 microprocessor. In effect, the CP/M system turns your 64 into another computer. The new Commodore 128 incorporates a built-in Z80 chip, and comes complete with the CP/M disk.

Why CP/M? The usual answer is that CP/M opens up a world of software, thousands of programs that you can run with the right hardware and operating system. But are these programs worth it? Many Apple owners would say yes. For a while, Z80 cards were the hottest add-ons available for Apples. It seemed logical that Commodore 64 owners would also want this power, at a fraction of the price. But CP/M has not caught on so far, at least in home computing.

The CP/M System

CP/M is an acronym for Control Program for Microcomputers. In essence, CP/M is merely an operating system, primarily a disk operating system. An operating system is the base software for a computer. It takes care of routine system tasks, and provides a link between the

computer and any other software you may be running.

CP/M began when Gary Kildall, working for Intel, developed a package of compactly written subroutines for the tiny 4-bit 4004 microprocessor. These useful sub-programs could be used by other programs, simplifying the work of a programmer. As technology advanced, CP/M became a full-blown operating system for the Intel 8080 microprocessor, and was upgraded for the 8080-compatible Zilog Z80 microprocessor. Curiously, Intel, the designer of the 8080, was not interested in CP/M, and gave Kildall the go-ahead to market it on his own. He started up a company called Digital Research. (Digital is still going strong; they recently developed GEM, the Macintosh-like operating environment of the new Atari ST computers.)

Before CP/M, there was no real operating system for these computers, so it was quickly seized upon by most users and manufacturers of Z80 computers. There were no successfully competitive operating systems, and CP/M easily became a standard. Since almost everyone had CP/M, all the Z80 machines had more in common with each other. CP/M made it possible for one program to run on many different computers.

Most Z80 computer systems included a

MAKE NO MISTAKE...

CALKIT for your Commodore 64 is a powerful, real-world problem solver. Faster, easier and more accurate than pencil, paper and calculator – and a lot less frustrating.



CalKit helps you solve household and small business problems that involve rows and columns of numbers.

- balance your chequebook in seconds
- plan your home or business budget with ease
- simplify your income tax, and your investment portfolio
- calculate loan or mortgage payments, and then find out what happens to them in seconds, when interest rates change

That's the real advantage – with CalKit, you can change any number in your equation, and see how it affects the other numbers. All calculations are performed instantly! CalKit gives you the answers, in the

time it takes to ask "What If...?" You can make projections and plan ahead with confidence!

The CalKit problem-solving package includes built-in templates for the most important home and business needs. Over 20 ready-to-use, real-life applications on one disk. The rows, columns and calculations are already defined. No need for time-consuming initial set-ups – all you do is enter your data. Other CalKit features, like on-screen menu and simple commands, make it even easier.

An easy and comprehensive manual with tutorials on each application are included. You'll be using CalKit like a pro, right out of the box. And once you've mastered the built-in templates, you'll be ready for your own unique spreadsheet programs.

Powerful solutions + ease of use + low low cost = CalKit. It all adds up to exceptional value, for a computer program that can help you every day.

BATTERIES INCLUDED



"The Energized Software Company!"

WRITE FOR A FULL COLOR BROCHURE

186 Queen St. West
Toronto, Ontario,
M5V 1Z1 Canada
(416) 596-1405

17875 Sky Park North,
Suite P, Irvine, California
USA 92714

which is a slightly enhanced version of the 64's 6510, and a Z80 chip for CP/M—Commodore is "trying to meet everybody's wish list," notes Commodore software engineer Terry Ryan. Commodore 64 owners who upgrade don't lose their software (according to Commodore, over 6,000 commercial titles now exist for the 64), those who want a readable 80 columns for word processing or spreadsheets can use the 128 mode, and CP/M will appeal to those interested in more serious business applications. Getting

from one mode to another is simple enough. From the 128 mode, type G064. However, once in 64 mode, you must reboot the machine to get to the 128 mode. According to a Commodore engineer, not a single byte was changed in the Kernal because Commodore wanted perfect compatibility with all 64 software. Since G0128 would even in the smallest way change the operating system, they chose the safer route—turn the machine on and type G0128. CP/M is accessed by inserting the CP/M 3.0 disk (CP/M is a

disk-based operating system) which is included with the machine.

The 128 includes a much more powerful BASIC than Commodore owners have seen. Named BASIC 7.0 and accessible only in 128 mode, it's derived from the BASIC 4.0 found in the venerable CBM 8032 model, but adds some new disk commands as well as those of the Super Expander 64. Thus, the tedious POKes required for sound and graphics on the 64 become unnecessary with this new machine. However, when

keyboard and monitor (or terminal), one or two disk drives, and 48K or 64K of memory. These computers were never designed to be compatible with each other, but CP/M took care of that.

The BIOS

Built into CP/M is a library of sub-programs for performing tasks like printing a character to the screen. Each computer might use a different kind of video display, so some portions of CP/M, the BIOS (Basic Input/Output Subsystem) were customized for each machine, but BIOS acted the same way on every machine. Because of the BIOS, programmers could write their routines to use these universal sub-programs instead of directly programming their particular computer's video chip. The program, if written properly, could run on any computer with CP/M. Machine-specific tasks became standardized routines.

A CP/M software market thrived, since developers could write a single program that would run on many different computers. Welcome to the computer that lacked CP/M. Even though the TRS-80 used a Z80, it took the efforts of third-party developers to bring CP/M to this machine. For a while, TRS-80 owners were isolated from the mass market, with a separate, smaller, library of software. CP/M

was the leader of the 8-bit world, and most small businesses used Z80 CP/M computers. CP/M machines occupied the niche that the IBM PC and PC clones control today.

Is It Obsolete?

The boom went to bust with the introduction of the IBM PC. CP/M machines just couldn't keep up with advances in hardware and software. Although the IBM PC was not a real breakthrough, it expanded the memory ceiling from 64K to 640K. Disk storage jumped from 100K to as much as 370K (double-sided disks). The faster and more powerful 8088 microprocessor made it easier to write better programs in less time. IBM's open architecture encouraged additional power, as more and more hardware companies enhanced the IBM with add-ons.

The microprocessor used in the IBM could not run CP/M, so a whole new standard was forged. (Digital Research's CP/M-86 was not available in time for the release of the PC, so it failed to establish itself as a standard. Microsoft's MS-DOS, which is much like CP/M, beat out CP/M-86 not because it was better, but because it was first.) The 8-bit Z80 world of CP/M was replaced by IBM's 16-bit 8088 world. Software developers jumped on the bandwagon, and CP/M was put on the

PlayNET announces 19 exciting ways to bring people together.

Now there's a Home Computer Network that lets you communicate with all kinds of people—all over the country! Make new friends, play exciting games, barter—shop—trade, all from the comfort of your home.

The network operates 6PM–7AM every weeknight, and 24 hours on Saturday, Sunday and Holidays. All you need to access PlayNET™ is a COMMODORE 64*, DISK DRIVE and MODEM.

1 TALK.

By typing on-line you can *talk to anyone*, or everyone, on the system. Meet fascinating people and make new friends from coast to coast.



2 ELECTRONIC MAIL.

You can *send private messages* to people on the system, and the message will be waiting when they sign on!

3 BULLETIN BOARDS.

You can *post announcements*, or check the listings of other members. There are lots of boards for hobbies and special interests! If you don't find the one you're looking for—create your own!



4 FILE TRANSFER.

You can even *transfer non-commercial programs* to other members! There is a small extra fee for this service.



5-17 GAMES!

PlayNET lets you play exciting games with real people, not just a computer. All our games have *full color graphics*, and they're all *interactive!*

- Plus the added feature of being able to talk with your opponent while you play. Discuss strategy, comment on moves, even try and psych your opponent out!
- New games are added all the time, and there are tournaments for every skill level.

CURRENT GAMES INCLUDE:



- Backgammon
- Boxes
- Capture the Flag
- Checkers
- Chess
- Chinese Checkers
- Contract Bridge
- Four-In-A-Row
- Go
- Hangman
- Quad 64™
- Reversi
- Sea Strike™

18 MORE! MORE! MORE!

There's *on-line updating* of your PlayNET Software as games and services are added. You have access to PlayNET's *Shopping Center* and *Information Center*, and every month you'll get our *Newsletter*.

19 YOUR SATISFACTION IS GUARANTEED for 30 days

(or your full subscription price will be refunded upon receipt of the package).

This is all you pay:

- \$39.95 for the PlayNET Software Package (3 disks and a User Manual) Monthly Newsletter, and 90 MINUTES ON-LINE TIME FREE!
- \$6 monthly service charge.
- \$2 an hour on-line time (The \$2 includes the telecommunication charges). That's much less than a long distance phone call.



Here's how you can become a member! It's easy to join, simply call PlayNET on the toll-free number, 1-800-PLAYNET, or send the coupon below and access all your Commodore 64 has to offer. The sooner you do, the sooner PlayNET can put the whole country at your fingertips!

PlayNET
The Network that has people talking

SEND TO PLAYNET, INC.
P.O. BOX 587
WYNANTSKILL, N.Y. 12198

OR CALL 1-800-PLAYNET

YES! I WANT PlayNET TO PUT THE WHOLE COUNTRY AT MY FINGERTIPS. I UNDERSTAND THAT MY SATISFACTION IS GUARANTEED FOR 30 DAYS (or my full subscription price will be refunded upon return of the package) I may cancel my membership at any time by writing PlayNET.

Bill me on my charge card for \$39.95. (Plus sales tax for New York State residents). No checks, cash or money orders accepted. Please send me the PlayNET Software, user manual, and 90 minutes of free on-line time.

Please print.

Name _____

Address _____

City _____ State _____ Zip _____

Phone (____) _____

Check one: MasterCard VISA

Card # _____ Exp. Date _____

Signature _____



in 128 mode, either 40 or 80 columns must be selected. With 40 columns, both sprites and the SID chip can be accessed, thus a Commodore 64 with 122K usable RAM. Graphics are not supported in 80-column mode. Also included is a built-in machine language monitor, an expanded version (direct access to disk is available) of the one packaged with the Plus/4.

In offering a more serious and powerful computer, Commodore is also featuring a new



The Commodore 128, "three computers in one," offers a new, more serious look.

back burner.

Since CP/M is no longer the dominant environment for high-end microcomputing (although CP/M machines are still selling today), why is it an issue on Commodore machines? It would seem the best bet would be an IBM MS-DOS emulator, with an 8088 instead of a Z80. Commodore probably went with CP/M because it is built around cheap, proven technology. The Z80 simply costs less than the 8088. And CP/M is more generalized, easier to adapt, than the MS-DOS used on IBM PCs. CP/M may be Commodore's way of crossing over from home computing to small business computing. Commodore is even translating some IBM software to CP/M, taking advantage of the similarities between CP/M and MS-DOS.

Most CP/M programs are written in 8080 or Z80 machine language. CP/M takes care of the minor differences between Z80 machines, but you still have to have a Z80 microprocessor. CP/M could be translated to run on any computer, such as the 6502, but what good is a 6502 version of CP/M if all the programs that run under CP/M are written in Z80 machine language?

Commodore CP/M

The CP/M cartridge for the 64 is a Z80 with

some control circuitry. It's designed so that it can take control of the 64's memory. When using this cartridge, you're essentially using another computer. The Commodore 64 CP/M BIOS was actually written in 6510 machine language. The Z80 remains in control until it needs to do something like printing a character to the screen, or reading a byte from disk. The Z80 then reawakens the 6510, and puts itself "on hold." The 6510 takes over, finds a request from the Z80, acts on it, then transfers control back to the Z80. It's unusual, but it works.

However, the 64 does not make a great CP/M computer. To get around memory limitations, CP/M resorts to intensive disk access. At the speed of the 1541, this makes programs run quite slowly. Also, most CP/M computers use a 64 or 80-column wide screen. The Commodore 128, with its 80-column screen and high-speed disk interface, may be much more suitable as a CP/M machine.

The disk that comes with 64 CP/M contains the CP/M operating system, plus some utility programs that let you do things like copy files and format disks. When you run CP/M, all you really have is an alternate DOS. It does nothing on its own, unless you're merely interested in programming the Z80 on your own. The missing link is CP/M software.

YOUR COMMODORE 64™ CAN NOW USE STANDARD APPLE™ II+ HARDWARE AND SOFTWARE



WITH THIS

At Mimic we believe that you and your computer should dictate the choices of hardware and software you can use.

The Spartan™ was developed to allow you to choose the hardware and software that best suits your needs.

Our goal in designing the Spartan™ was simple. To take what you already have and give you more.

Mimic Systems is proud to give you the Spartan™ The Apple™ II+ emulator for the Commodore 64™

Spartan™ Suggested Retail Prices:

The Spartan™ (includes BUS, CPU, and DOS cards) \$599.00

BUS card \$299.00

CPU card (requires BUS card) \$199.00

DOS card (requires BUS and CPU card) \$199.00

(All prices in U.S. Funds. Freight not included.)

American Express, Visa and MasterCard accepted.

Commodore 64 and Commodore logo are trademarks of Commodore Electronics Ltd. and/or Commodore Business Machines, Inc. Apple II+ is a trademark of Apple Computer, Inc. Spartan™ is a trademark of Mimic Systems Inc. and has no association with Commodore Electronics or Apple Computer, Inc. The Spartan is manufactured by Mimic Systems Inc. under license granted by ATG Electronics, Inc. of Victoria, B.C., Canada.



MIMIC

FOR INFORMATION WRITE:

MIMIC SYSTEMS INC.
1112 FORT ST., FL. 6J
VICTORIA, B.C.
CANADA V8V 4V2

To Order Call:

1-800-MODULAR
(663-8527)

design. At first glance, one is reminded of an IBM-PC. It's a smart-looking, sleek machine with an off-white color. The keyboard has been thoughtfully designed, especially for those upgrading from a 64. With the exception of the function keys, the 64's keyboard is intact (see photo). But there's a lot more. A numeric keypad is included to the right of the main character keys. A top row, from left to right, includes ESCAPE, TAB, ALternate, CAPS LOCK, HELP (similar in function to the help key of the Plus/4), LINE FEED,

40/80 DISPLAY, and NO SCROLL. Continuing on that row are four cursor keys, providing an alternative for those who never liked or got used to those on the 64, and four function keys, identical to those on the 64.

The 128 might be seen as an entry into the lower end of the business market currently dominated by the IBM-PC and its compatibles. While this is arguable, the fact that it seriously upgrades the power and flexibility of home computing is not. A huge array of CP/M-based soft-

ware exists, although the PC market has moved away from CP/M in favor of MS-DOS (see "What Is CP/M?" for more on this). A plus for the new machine is its support of true 80 columns with RGB output. Unfortunately, Commodore owners with composite monitors, such as the 1701, 1702, or 1703, will have to upgrade to an RGB monitor to use the 80-columns of the 128. While the technology of the 128 is not new, Commodore is offering a solid product at a very affordable price.

Where's The Software?

Thousands of good programs were written for CP/M and are still in use today. CP/M users and user groups created a vast amount of public-domain software. Most of this software would run under 64 CP/M, if you could get it into memory. But the 1541 disk drive can't read a CP/M disk. More 1541-readable software is necessary for CP/M to have any value at all. A large New York user group has been busy transferring public-domain software to 1541 format (see the "Horizons" column in the October 1984 GAZETTE for more information), but the amount of usable CP/M software is still dismally small. Commodore, at the time of this writing, has two programming languages you can run under CP/M: Nevada Cobol and Nevada Fortran. Soon, Commodore will release a set of business tools, the Perfect software series (see the CES feature story for more on this).

The new 1571 disk drive helps solve the problem. CP/M for the Commodore 128 reprograms the disk drive so that it can directly read disks created on other disk drives.

Why bother with CP/M at all? There are many good CP/M word processors, but there are several word processors for the 64 that are every bit as good. There's much more business software available to CP/M machines, but

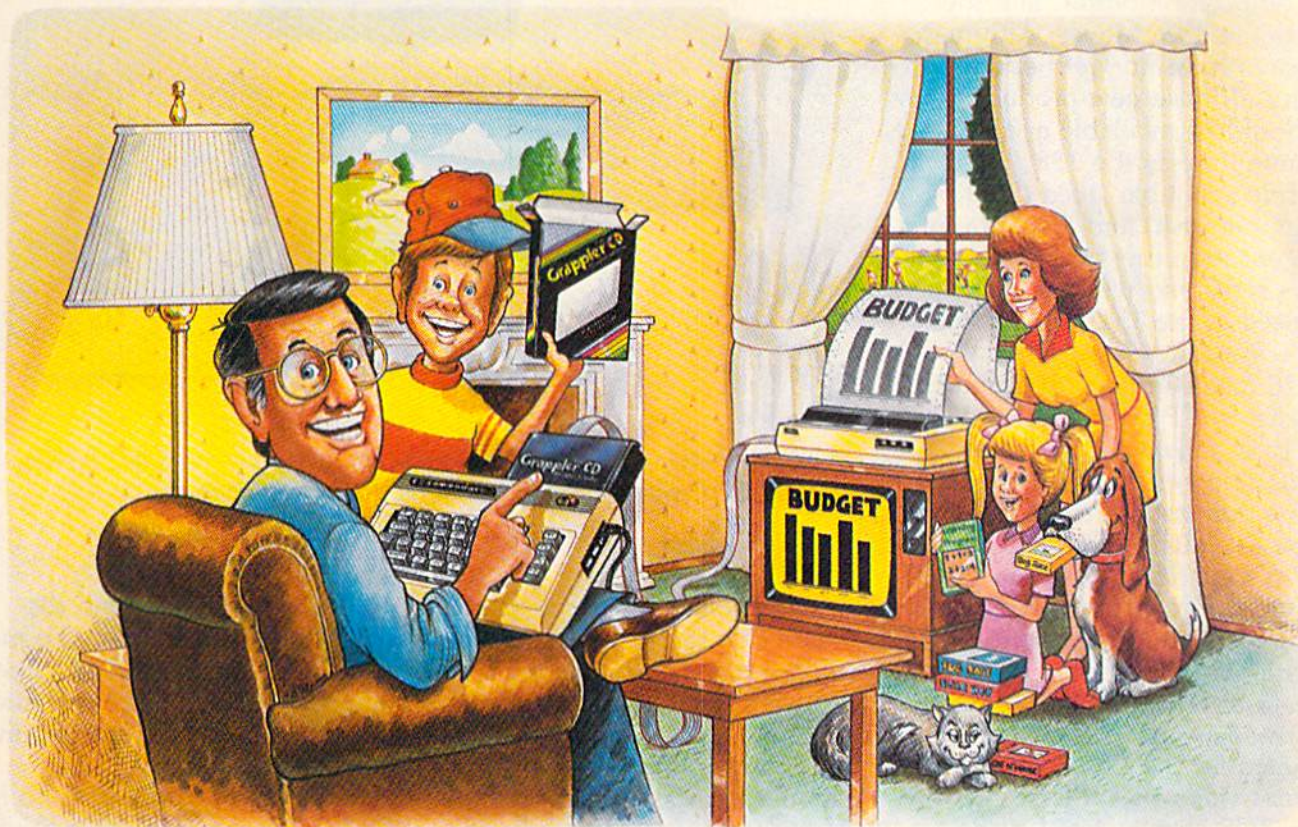
most home computerists won't really want to run an Accounts Receivable program. When the 64 was first introduced, CP/M looked like an excellent way to get around the paucity of available software, but there's now almost too many 64 programs to choose from.

A Business Bargain

However, CP/M may make the Commodore 128 a bargain buy for small businesses. The price of the Commodore 128 with the 1571 disk drive is competitive with the IBM PCjr. CP/M software has been around long enough to be time-tested and bug-free. There's so much CP/M software that there's a good chance you'll find special-interest programs—programs that wouldn't have mass appeal, but could be just what you're looking for. For example, some programs are customized for particular businesses, such as a bookkeeping system designed especially for a dental practice.

CP/M promises a cornucopia of software. Some of this software may be useful to you, although most of it probably won't. It remains to be seen though, with all the technological advances we're now seeing in hardware and software, if anyone really wants to run five-year old software.

"Now Your Commodore 64™ Can Print Like a Pro!"



Grappler™ Printer Interface

The Revolutionary Printer Interface for the Commodore 64™

A New Era in Commodore Printing Power.

Grappler CD offers the first complete answer to your printer interfacing requirements, with many powerful capabilities unique in the Commodore marketplace. Complete signal translation allows many popular name brand printers to operate perfectly with the Commodore 64, or to imitate Commodore's own printer. Even Commodore's graphic character set can be reproduced on Epson, Okidata, Star, ProWriter and other popular printers.

Exclusive Grappler CD features provide a variety of graphic screen dumps, text screen dumps and formatting. No other Commodore interface can offer this.

If you own a Commodore 64...

If you're serious about quality, trouble free printing... You need the Grappler CD.

Contact your nearest Commodore dealer or call Orange Micro for a dealer near you.

Commodore 64 and Commodore 1525 are trademarks of Commodore Electronics Limited. Epson is a registered trademark of Epson America, Inc.

A Uniquely Intelligent Interface:

- Prints Screen Graphics Without Software
- Graphics Screen Dump Routines Include Rotated, Inversed, Enhanced and Double Sized Graphics.
- Full Code Translation From Commodore's PET ASCII to Standard ASCII, the Language of Most Printers.
- Complete Emulation of the Commodore 1525 Printer for printing of Commodore's Special Characters.
- Dip Switch Printer Selection for Epson, Star, Okidata, ProWriter and other popular printers.
- Conversion Mode for Easy Reading of Special Commodore Codes.
- Text Screen Dump and Formatting Commands
- 22 Unique Text and Graphics Commands



1400 N. LAKEVIEW AVE., ANAHEIM, CA 92807 U.S.A.
(714) 779-2772 TELEX: 183511CSMA

© Orange Micro, Inc., 1983

In support of the 128, Commodore also has a new line of peripherals: the 1571 Disk Drive, the 1901 Monochrome Monitor, the 1902 RGBI/Composite Monitor, and the Commodore Mouse. Although prices have not yet been set on any of these new products, they should be available at about the same time as the 128. The 1571 drive is double-sided (360K storage per disk) and far more intelligent than the 1541. Although it's serial and reads at the same speed as the 1541 in 64 mode, it's five times faster when used in 128 mode and almost 12 times faster in CP/M mode. Most CP/M software, regardless of format, can be used with the 1571. The drive is also compatible with the 64, Plus/4, and LCD.

The 1901 is a green screen 80-column monitor designed for business and productivity applications such as word processing, data base management, and spreadsheets. The 1902, ideally suited for the 128, contains a front video switch for composite or RGB display. In 64 mode, composite (40 × 25 columns) would be selected, thus emulating the display of the 1700 monitor series, and in 128 or CP/M mode, either composite or RGB (80 × 25 columns) is available.

The Commodore Mouse, functionally identical to Apple's mouse, provides an alternative to a joystick. No price and few details were announced, but it should be available for the 128 later this spring.

Commodore also announced the 1670 Modem, a 300/1200 baud modem which features auto answer/auto-dial, auto baud, and parity. (Auto baud determines the baud rate of another computer and automatically adjusts the rate of data transmission.) It's compatible with the 64, Plus/4, and 128. Although we didn't see the 1670 at the show, it should be available this spring. It may be priced at less than \$100, a real bargain for a 1200-baud modem.



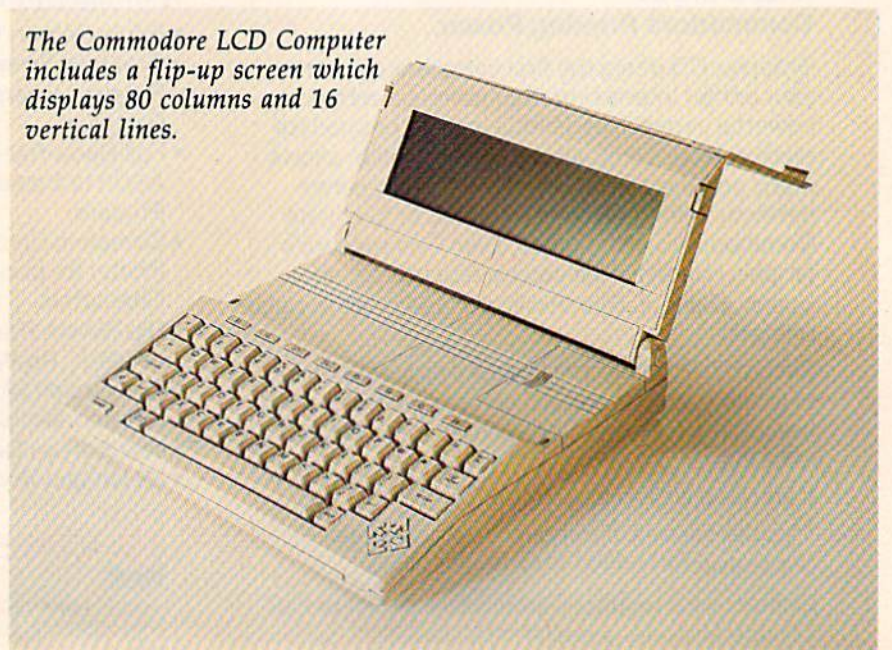
Among the new Commodore peripherals are the Mouse, MPS 802 Printer, 1902 RGBI/Composite Monitor, and the 1571 Disk Drive.

Commodore's second major entry, the LCD, is a portable lap computer, with built-in software, modem, and flip-up screen. Commodore was showing only prototypes of this machine, so it was difficult to assess the software (word processor, file manager, spreadsheet, address book, scheduler, calculator, and memo pad). However, we did note that the LCD screen is exceptionally fast,

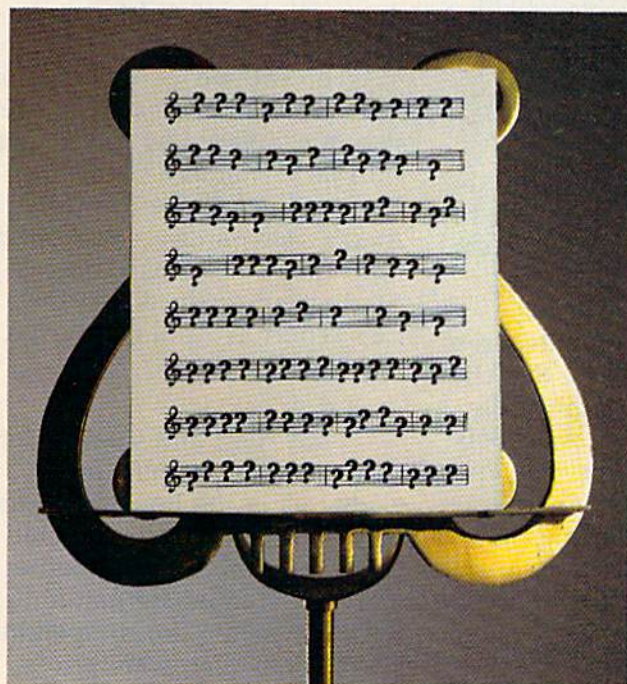
and the 80 × 16 column display is highly readable. The machine runs on four AA alkaline batteries or external power, and is easily transportable, weighing about three pounds.

The microprocessor used in the LCD is the 65C102, a modified and faster version of the 6502. Importantly, Commodore has included several I/O ports: RS-232, Centronics parallel, barcode, standard Commodore serial, and the 300-baud, auto

The Commodore LCD Computer includes a flip-up screen which displays 80 columns and 16 vertical lines.



Compose music, even if you can't read a note.



With the Bank Street MusicWriter by Glen Clancy, you compose by computer.

It's so simple, people who don't know a pianissimo from a pizza can start composing in less than an hour.

All you do is match the sound that you hear in your head. And the MusicWriter writes it down.

But don't be fooled by the

simplicity. It's not a toy. It's a tool.

In fact, MusicWriter has everything you need to compose a serious symphony. It has repeats, endings and triplets. It has articulation and transposition. It can shape tones, store 75 staves, and play up to 4 voices.

But even if you don't know what all that means, it won't stand in your way. Because if you can hum a tune, you can write a tune.



Bank Street MusicWriter from Mindscape

Compatible with Atari® and Commodore®. Mindscape, Inc., 3444 Dundee Road, Northbrook, Illinois 60062.

For more information, call 1-800-221-9884. In Illinois, 1-800-942-7315.



answer/auto-dial modem. The LCD is programmable (BASIC 3.6 is included), and it stores files permanently. If peripheral file storage is appropriate, the LCD is compatible with the 1571 and 1541 disk drives. Curiously, Commodore was showing Sony-standard 3-1/2" serial disk drives in use with the LCD, but little information was available on these obviously raw prototypes.

If Commodore delivers the LCD for under \$600, it should have a very strong competitive edge in the "notebook" computer market.

Several other important announcements were made at Commodore's CES press conference. One of the most heartening, for Commodore owners, was the establishment of a national service network which includes 160 RCA service centers, about 800 Sears stores, and nearly 1300 other outlets which include computer stores. Computers and peripherals in or beyond warranty can be serviced at these locations beginning in March.

Although a lot of software for the 64 was announced by third party companies (see "CES Perspective: Much More For The 64"), Commodore introduced only two new packages, both for the 128. *Jane*, developed by the Arktronics Corporation, is icon-based productivity software featuring an integrated word processor, spreadsheet, and filing system. It's designed for use with a joystick or the Commodore Mouse. Reminiscent of Macintosh software, *Jane* uses pop-up menus and windows. For 80-column CP/M mode on the 128, Commodore announced the Perfect Series, produced by Thorn EMI. This integrated software line, which includes *Perfect Writer*, *Perfect Calc*, and *Perfect Filer*, has been on the market in MS-DOS for-

mat for the IBM-PC and compatibles for some time. No prices were announced for *Jane* or the Perfect Series.

While Commodore has an impressive array of new hardware, Atari has the jump on offering a new technology to the low-end market. Jack Tramiel and dozens of ex-Commodorians (collectively self-identified as the "New Atari"—although others may prefer the "Old Commodore") unveiled six new computers, seven printers, three disk drives, and four monitors.

Atari's new computers represent two new series, the XE line (four machines upwardly compatible with the Atari 800 and 800 XL), and the real showstoppers, the 130ST and the 520ST. The ST machines, driven by the 16/32 bit Motorola 68000 microprocessor, the same chip found in the Macintosh, can basically be understood as color Macintoshes with a choice of input devices (keyboard, joystick, or mouse) and several more features. For \$599, the 520ST offers 512K RAM, a built-in hard disk interface (for \$399 you can get an extra 15 megabyte hard disk for storage, the equivalent of about 90 Commodore 1541 disks), three screen graphics modes (640 X 400 pixels in hi-res), a three-voice sound generator with a MIDI interface for communication with external electronic instruments such as synthesizers, and a GEM operating system, which controls graphics features such as icons, windows, and drop-down menus.

The 130ST is a 128K version of the same machine and is priced at \$399. The XE series includes the 65XE, a 64K enhanced version of the 800XL, to sell for \$99; the 130XE, a 128K version for under \$200; the 65XEP, a transportable version of the 65XE which includes a

built-in monochrome monitor, 3½-inch disk drive, and battery pack, to sell for under \$400; and the 65XEM, essentially a 65XE with an eight-voice AMY sound chip that includes 64 oscillators. Reportedly, the AMY chip can be programmed to simulate any musical instrument. This machine will be offered for under \$200.

The support peripherals for all of Atari's new machines are also priced very low in keeping with Jack Tramiel's marketing philosophy. Release date for Atari's new hardware is April or May. (For more details on Atari's new products, see the CES report in April COMPUTE!).

With Atari and Commodore as the two remaining gladiators in the low-end arena, 1985 will prove to be an interesting year. Both Commodore and Jack Tramiel are notorious for underselling the competition, and the new hardware prices, while surprisingly low, are not really unexpected. But, while both companies are claiming Apple and IBM as targets, they're also aiming at each other. One source told us that the Atari ST is really Commodore's Amiga (also with a 68000 microprocessor), that some of the engineers brought to Atari from Commodore by Jack Tramiel knew the Amiga well enough to produce a replica. But Commodore denies this, hinting that the Amiga is more powerful and different than the ST. All intrigue aside, we'll see the Amiga in the market later this year. (For details on the Amiga, see "The Editor's Notes" in the November 1984 GAZETTE.)

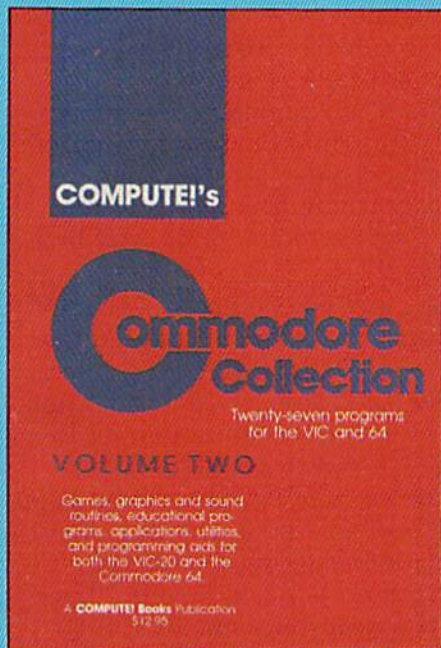
We're sure to see more from Commodore and Atari at the Summer CES in June, and possibly even before then. But their announcements at this CES are significant if only for one reason: much more power at much lower cost.

For Commodore owners, the latest collections from COMPUTE! Books

COMPUTE!'s Commodore Collection, Volume 1
Twenty-eight original programs for the VIC and 64
Edited

The *Commodore Collection*, an anthology of 28 previously unpublished programs for the VIC-20 and Commodore 64, continues the COMPUTE! tradition of practical programs in easy-to-use form. Includes exciting games, stimulating educational programs, valuable utilities, and useful applications to make your Commodore computer an exciting part of every day.

\$12.95 ISBN 0-942386-55-8



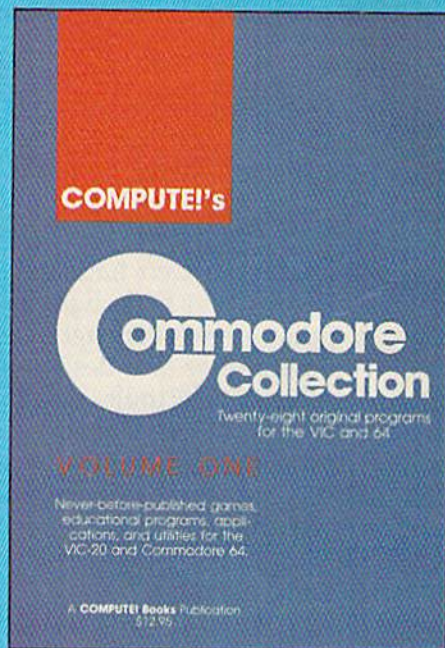
COMPUTE!'s Commodore Collection, Volume 2

Programs for the VIC and 64

Edited

Exciting games, sophisticated applications, versatile educational routines, and helpful programming aids for the VIC-20 and Commodore 64 highlight this second volume in COMPUTE!'s Commodore Collection series. Included are some of the best articles and programs from recent issues of *COMPUTE!* and *COMPUTE!'s Gazette*, as well as many programs published here for the first time. Designed for Commodore computer users of all levels, it's a book that every VIC or 64 owner will want to have.

\$12.95 ISBN 0-942386-70-1



To charge your order, call toll free 800-334-0868 or send in this coupon with your payment to COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403.

Please add \$2.00 shipping and handling per copy ordered.

Payment enclosed (check or money order)
 Charge: Visa MasterCard American Express

Account No. _____ Exp. Date _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Please allow 4-6 weeks for delivery.

754CCG

___ copies of *COMPUTE!'s Commodore Collection, Volume 1* @ \$12.95 ea. _____

___ copies of *COMPUTE!'s Commodore Collection, Volume 2* @ \$12.95 ea. _____

Shipping & handling, \$2.00/book _____

Total payment _____

CES Perspective:

Much More For The 64

Kathy Yakal, Feature Writer

Christopher Cerf had some explaining to do when he bought a home computer a few years ago. Cerf, a long-time author and designer of children's educational tools, was told by a friend that he would no longer be a good writer. "You shouldn't be using a word processor," said his friend. "Everyone knows that the only time you have a good idea is when you're pushing the manual carriage returns on an old Royal typewriter."

In spite of the computer industry's progress in recent years, that kind of attitude still prevails among a number of people. Fear of the unknown, and the inevitable failure of myriad hardware and software companies and trade publications, have given the public (and the press) countless opportunities to predict extinction.

If last January's Consumer Electronics Show was the beginning of the end, it didn't look like it. This was to be the CES, said many industry observers, where everyone would be holding his breath.

It appears, rather, that it was just the end of the beginning. True, the ranks continued to thin out. But the strong showing by Commodore and Atari, as well as the promise of healthy third-party support for both companies, were encouraging. The next generation of home computers is well on the way.

"We're just at the beginning of the industry," says Jim Levy, president of Activision. "The doomsayers are saying it's not what they thought. Well, it is what it is. What it is, is very young. There are still only a few million real computers, and state-of-the-art in software is still primitive."

"We can't look for an overnight explosion, but it's not going backwards either. The computer is too fundamental a consumer product revolution not to happen. Over the next few years, there will be nice, steady growth. And it will still be one of the fastest growing consumer industries."

Though some very promising software appeared at CES, the main excitement on the floor was over hardware. Young employees of the new Atari Corporation, uniformly dressed in gray slacks and maroon sweaters, stood next to their new machines for hours, tirelessly answering questions. Prototypes of the new Commodore computers revolved in a showcase window as crowds constantly pushed through the booth for a closer look.

Besides the new computers, many new peripherals for Commodore were introduced by third party companies. At least four Commodore-compatible disk drives were shown, from Cardco, Indus, MSD, and Blue Chip Electronics.

Printers are getting even cheaper, faster, and more powerful. Okidata introduced the Okimate 120, a dot-matrix, 120 cps printer. Unlike its sister, the Okimate 10, it does not print color. It uses a cartridge ribbon for longer wear. Price is expected to be under \$300.

Star Micronics, manufacturer of the popular Gemini-10X, premiered a new line of dot-matrix printers, including the SG-10, an enhanced 10X priced at \$299. It runs 20 percent faster, has a near-letter-quality (NLQ) mode, and a larger buffer. Prices in the new SG, SD, and SR printer lines range from \$299 to \$799.

At least two companies showed new music keyboards for the Commodore 64. The *Music Port*, by Tech Sketch, features a full-size electronic keyboard with true digital synthesizer capability. With software, it has a suggested retail price of \$149. Sequential Circuits announced the *MusicMate*, a full-size keyboard priced at \$99 with the starter software package (expansion software is available for \$39.95).

Activision was one of dozens of companies at the show introducing new entertainment and home productivity software for the 64. New programs include *The Music Studio*, a music composition and audio synthesis package; *Web Dimension*, a rich sound-and-graphics

BEFORE LOADING YOUR SOFTWARE
MAKE A PERFECT BACKUP WITH

NEW!
Version 2.2

DiskMaker



with
MasterKey

99%
EFFECTIVE

THE AUTOMATIC DISK BACKUP SYSTEM FOR YOUR 64 & 1541 DRIVE!

- Actually copies a FULL disk in only 4 MINUTES!
- Easiest to use – TOTALLY automatic copy utility
- State of the "ARTS" copy capability!
- UNLOCKS protected disks for backup copying
- Breaks through LATEST protection schemes
- Includes FAST copier, "ARTS" copier and TRUE Nibbler: you get 3 copiers for the price of 1
- HALF-TRACKING up to & including track 40!
- 100% machine code for fast, RELIABLE operation

- 4 min. copier AUTOMATICALLY puts "errors" on copy
- Fastest & most advanced copier you can buy
- Writes errors 20,21,22,23,27,& 29 WHILE COPYING!
- Transforms your 1541 into a SUPER-FAST copy drive!
- NO analysis required, just swap disks & NO damaging drive knock during errors or format
- Formats AS IT COPIES, detects & reproduces NON-STANDARD formats & I.D. mismatch, DOS flags
- PRODUCT SUPPORT tel. #, revisions, & upgrades

OVER 500% FASTER THAN OTHER COPIERS!



ONLY

\$49.95

To order CALL **805-687-1541 ext. 64**
Technical line 805-682-4000 ext. 99



for entire system

For rush service call 24 hr. order line or send cashiers check/money order. Visa, MasterCard, & American Express include card# and exp. date. CA residents add 6% tax. Allow 2 weeks for clearance of personal & co. checks. Add \$3.50 shipping & handling for continental U.S./\$5.50 for UPS air. AK, HI, APO, FPO, CANADA add \$7.50. Other Foreign orders add \$8.50. All APO, FPO, & orders outside 48 states must be paid by certified U.S. funds. C.O.D.'s shipped to U.S. addresses only, add \$4.00. School orders welcome.

DISKMAKER PAYS FOR ITSELF THE FIRST TIME YOU USE IT!

basix



The Star Micronics SG-10, a faster, less expensive version of the Gemini 10X, was introduced at CES.

trip through the evolutionary stages of man ("from atoms to astronauts"); and *Rock 'n Bolt*, a humorous strategy/action game.

Sneak previews of summer releases were also on display: *Countdown To Shutdown*, a futuristic action/adventure game involving a team of robot commandos which must prevent a reactor shutdown; *Alcazar: The Forgotten Fortress*, a fantasy/adventure set in a Spanish countryside; *The Great American Road Race*, a cross-country trek; and *Fireworks*, a fireworks display construction set.

Levy and his staff try to determine what will please their home computer audience the same way a film studio decides on projects, or a soap company tests different scents and sizes. "Consumers are looking for what they've always looked for," says Levy. "Two things. The things he has to do in his life—he wants them to be easier, quicker, and more interesting. The second is good things to goof off with. We all live that way. We eat and sleep, and the rest of the time we either work or play. So it's important to recognize that the computer has two fundamental functions from a software standpoint: things that you have to do that the computer can help you do easier, faster, and better; and creative use of goof-off time."

Creative, inexpensive use of goof-off time was offered at the show by Mastertronic, a British software firm that has recently begun U.S. distribution. "Sales of game software did not reach projections for the past year, mainly because of price," says Mastertronic's Dave Harding. "Mastertronic Ltd. did something about this, first in England (where it has sold more than two million pieces since April), and then in Canada. We will do the same here."

The initial ten titles, priced at \$9.99, include arcade games (*Chiller; 1985-The Day After; Dark Star; More Adventures Of Big Mac; The Mad Maintenance Man*) and one adventure game, *Monty Python's The Quest For The Holy Grail*. Ten additional programs will be released by mid-1985: arcade games, strategy games, and the firm's first four educational programs. Also a part of this group will be *The Games Creator* (\$19.99), an arcade game construction set which lets nonprogrammers create or alter every aspect of game play.

"You Can't Kid A Kid" was software publisher Epyx' theme, and kids ran the show at their booth. Several 8 to 15 year olds demonstrated Epyx' line of entertainment software, including 13 new titles. *Ballblazer*, developed by Lucasfilm Games, is a futuristic two-player fantasy game using a split screen and distinctive

Why settle for less when you can have Mo?



Introducing Mitey Mo, the ready-to-go modem that turns your Commodore 64® into a telecommunications giant.

Mitey Mo is the complete—and affordable—telecommunications system for your Commodore 64. It will open up a world of practical and exciting uses for your computer, and it will take you online faster and easier than anything else you can buy.

Now you'll be able to send and receive electronic mail, link up with community bulletin boards, play computer games with people in distant places, do electronic banking, and tap into library resources to find the material you need for your reports. All at your convenience.

Until Mitey Mo, Commodore's 1650 Automodem was the obvious choice when you went looking for a modem for the C-64. Like Mitey Mo, it has "auto-answer"—it receives data while unattended. And both modems are "auto dialers"—you dial right on the computer's keyboard. But that's about where their similarity ends.

Suppose you dial a number,



MODEM FEATURES	MITEY MO	COMMODORE AUTOMODEM
Auto Dial	YES	YES
Auto Answer	YES	YES
Auto Redial	YES	NO
Smart 64 Software Included	YES	NO
Upload/Download Capability	YES	NO
VT-52/VT-100 Emulation	YES	NO
Menu Driven	YES	NO
28K Software Buffer	YES	NO
Printing Capability	YES	NO
Easy-to-Use Manual	YES	NO
Bell 103 Compatible	YES	YES
Multiple Baud Rates	YES	YES
Cables Included	YES	YES
Single Switch Operation	YES	NO
Warranty	1 year	90 days

Some mighty interesting features—ours and theirs. Yours to decide.

and you find that it's busy, Mitey Mo has "auto redial"—it hangs up and redials immediately until it gets through. With the other modem you have to redial each time—and somebody with auto redialing can slip in ahead of you.

Mitey Mo is menu-driven. It lists the things you can do on the screen. Select a number and you're on your way. Since Automodem isn't menu-driven, you'll be hunting through the manual a lot.

Mitey Mo has only one switch, the customized software does the rest. Every family member will find it

easy to use. With the other modem you'll have to remember to check three switches, otherwise you may be answering when you mean to be originating.

Mitey Mo gives you access to 14 pages of memory (28,000 bytes), so you can store data and review or print it later. The other modem doesn't let you store or print anything.

Mitey Mo is half the size of the other modem. The very latest technology allows miniaturization and increased reliability, as well. Mitey Mo is so reliable, we gave it a full one-year warranty. The other modem gives 90 days, then you're on your own.

Not only will you find Mitey Mo mighty useful, you'll find it mighty reasonably priced. Call us at (415) 633-1899 and order your Mitey Mo today.



USI CDI/Computer Devices Int'l
1345-A2 Doolittle Drive
San Leandro, CA 94577
(415) 633-1899

three-dimensional graphics. *Rescue On Fractulus* is a space action/strategy game featuring 3-D flight simulation also developed by Lucasfilm. *Summer Games II*, sequel to the successful *Summer Games*, and *The Right Stuff*, a flight simulation game set during the Battle Of Britain in World War II, were also introduced.

Synapse Software initiated its Electronic Novel series, a new line of interactive adventure games/novels. The Electronic Novels are written by an author-programmer team, using a proprietary language developed by Synapse. The first titles in the series are *Mindwheel*, a journey into the minds of four deceased people of extraordinary power (written by Robert Pinsky), and *Essex*, the story of an intergalactic search and rescue mission.

Professional Software rolled out the second volume of its popular *Trivia Fever*, as well as a special sports edition. *Trivia Fever, Volume 2* retails for \$24.95, *Super Sports* for \$29.95.

The Music Shop, one of Brøderbund's new releases, is both a music composition tool and music synthesizer. It offers a Macintosh-like environment for ease of use and will sell for \$44.95.

Creative Software has added to its line of entertainment and personal productivity software for the Commodore 64 with *Trolls And Tribulations*, a strategy/action game in which the player leads his six trolls through treacherous underground caverns to recover hidden treasures. It retails for \$24.95.

Shakespeare and sports are the themes of Imagic's new software offerings. In *Macbeth*, from Imagic's Time Traveler series, you return to eleventh century England to find out if the character Macbeth was a murderer and tyrant or a hero tricked into self-destruction. The Action Sports series includes *Tournament Tennis*, *Grand Slam Baseball*, and *Touchdown Football*.

Strategic Simulations, Inc., long recognized for excellence in strategy and war games, introduced *Kampfgruffe*, SSI's answer to the advanced wargamers search for a technical level warfare game on the eastern front during World War II. It retails for \$59.95.

CalKit is Batteries Included's latest entry in the home productivity market. It's a flexible home finance and math package designed like a simplified spreadsheet. (Batteries Included also has a new interface that links the Commodore 64 to printers from all the major manufacturers.)

Mindscape president Roger Buoy had been offered four different software companies by the third morning of CES. A bad sign for the educational software industry? Not at all, he says.

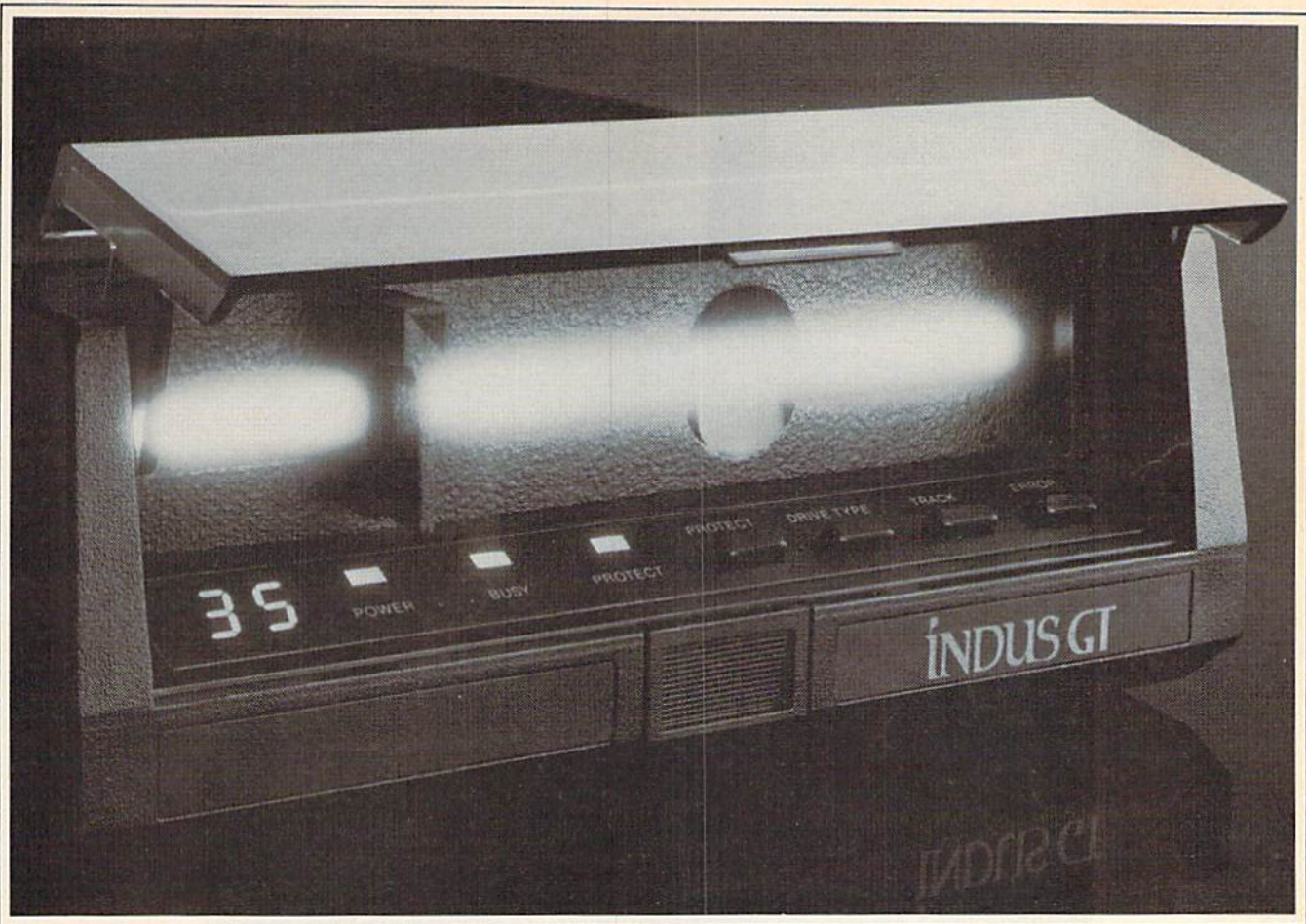
"People make all this noise about the shakeout, but it's really a lot of nonsense," says Buoy. "What's going on in this business is no different from what's going on in other businesses. You always have companies that are not properly funded and not properly managed that fall by the wayside. That's not an abnormal phenomenon. It happens in every new business. But this one is highly visible, and it has a lot of pop culture in it."

Buoy recalls a CES three years ago when there were three or four educational software publishers exhibiting. Two years later, he says, there were 79. "The market has grown tremendously, but when you're trying to share it with 79, the personal shares become less."

Mindscape showed two new programs in its Sprout line, educational software developed by children's author Mercer Mayer: *Castle Clobber* and *Subtraction Fair* (\$24.95). *Bank Street Storybook*, by George Brackets, and *Bank Street MusicWriter*, by Glen Clancy, were both being demonstrated by their authors. Software

Software developers Christopher Cerf and Joyce Hakansson teamed up to produce *Kermit's Electronic Storymaker*, one of a series of programs being marketed under the banner of the Muppet Institute of Technology and published by Simon & Schuster's Electronic Publishing Group. The programs are designed to stimulate reading and writing skills, and to encourage imagination.





What you get if you cross a Commodore 64 with a Ferrari.

You get the incredible Indus GT™ disk drive. You get brains. You get beauty. But, that's not all you get. You get a disk drive that can handle 100% of Commodore's software. Up to 400% faster. You get the disk drive with the best service record around. With a one year warranty on parts and labor to prove it.

And, you get the only disk drive that comes with free software. Word processing. Spreadsheet. Database manager. Plus, a carrying case that doubles as an 80 disk storage file.

Most of all, you get luxury. From the sleek lines of its sound-proofed chassis to the responsive AccuTouch™ controls at the Indus CommandPost™. From the

LED display that keeps you in control of your Commodore to the air-piston operated dust cover that protects your disks and drive.

So, you know what you really get if you cross a Commodore 64 with a Ferrari? You get the best.



INDUS™



Sequential Circuits MusicMate, a \$99 musical keyboard for the Commodore 64.

developer Tom Snyder was also on hand to show people around the universe with his new project for Mindscape, *The Halley Project: A Mission In Our Solar System*, a real-time simulation of the solar system. And *ColorMe: The Computer Coloring Kit*, lets young children design their own pictures, coloring books, and stickers, then print them out.

Like Mindscape, a subsidiary of SFN Companies (a large textbook publisher), CBS Software has major financial backing. "It's comforting not to have to answer to bankers and investors," says president Ed Auer. "The CBS vision goes far beyond the last quarter of '84 or the first quarter of '85. We're in it for the duration."

CBS introduced 12 new programs at CES, expanding their line to a total of 58. *Success With Algebra* includes four classroom-tested algebra tutorials for grades 7-12. *The Sea Voyagers* is an electronic learning game which chronicles the lives and discoveries of 30 New World explorers. Children's TV show host Fred Rogers was involved in the development of

Many Ways To Say I Love You, a design tool that allows children to create their own electronic greeting cards. In *The Railroad Works*, you can plan and build railroad empires.

Auer is not nervous about the state of the industry. "We never did believe the predictions of a few years ago, that 40 percent of homes would have computers by 1987. By the 90s, that's entirely feasible. We're very comfortable that it's going to be a significant industry."

Perhaps those people who weren't holding their breath at last winter's CES were catching theirs. "We have the opportunity to manage our businesses better now that things aren't moving so rapidly," says Activision's Levy.

"We're now evolving into a real industry from sort of a business. This gives us a chance to develop some good management and planning within our companies and within the industry, to stop misbehaving so much." ©



List Price \$129.00*

Dealer and Distributor Inquiries Invited

COMMODORE OWNERS:

"Finally, A Universal Graphics Interface!"

The ALL NEW "MICROGRAFIX" parallel interface by Micro World Electronix Inc., is a complete switch selectable interface with full graphic capabilities for the VIC 20™ and Commodore 64™. It's truly the most universal of Interfaces with the capacity to print the Commodore® graphics set, since it is switch selectable for virtually all centronics compatible parallel printers including Daisy wheel printers.

Features:

- 1) Fully intelligent Interface that plugs into the Standard Commodore® printer socket.
- 2) Complete graphics capability that will allow popular matrix printers to fully pass the Commodore® Printer test (including Inverse text, tabbing, cursor up/down, etc.).
- 3) Works with virtually all software, since it provides emulation of the Standard Commodore® Printer.
- 4) Optional user installed 4K buffer to speed up graphics and text printing.
- 5) Complete built-in status and self-test report.
- 6) Switch Selectable Commodore® graphics mode for most popular printers (Epson, Star Micronics, C. Itoh, Prowriter, Okidata, Seikosha, NEC, Riteman, Banana, BMC, Panasonic, Mannesman Talley and others) plus a Universal Switch mode for letter quality printers.
- 7) Complete with emulate mode, transparent mode, total text mode, ASCII conversion modes that will insure virtually total compatibility with popular Software.

No more ROM changes or extra shelf space taken up. The Micrografix Interface is easier to stock since one interface will support virtually all printers.

Order From:

MICRO-W.
DISTRIBUTING, INC.

1342B Route 23
Butler, New Jersey 07405
(201) 838-9027

* TM Trademarks of Commodore Business Machines, Inc.
* Call for details on our super \$50.00 trade-in offer.

DI-SECTOR

Version 2.0

**EVERYTHING YOU EVER WANTED IN A DISK UTILITY . . . AND MORE!!
FOR THE COMMODORE 64***

- ★ Fully automatic back-up of almost any protected disk.
- ★ Copy files [PRG, SEQ, RND] with full screen editing.
- ★ Three minute back-up of standard disks [even many protected disks].
- ★ Format a disk in ten seconds.
- ★ Remove errors from any track/sector.
- ★ Edit sectors in HEX, ASCII — even assembler.
- ★ Create errors on any track/sector [20, 21, 22, 23, 27, 29] instantly.
- ★ Drive/64 MON, even lets you write programs inside your 1541.
- ★ All features are fully documented and easy to use.
- ★ None of our copy routines ever makes the drive head "kick."
- ★ View and alter sector headers.

Yes, you get all of this on one disk for this low price! \$39.95

. . . Continuing Customer Support and Update Policy . . .

... WRITE OR PHONE ...

STARPOINT SOFTWARE

Star Route 10

Gazelle, CA 96034

[916] 435-2971

All orders add \$2.00 shipping/handling.
California residents add 6% sales tax.
COD orders add an add'l. \$3.00 shipping.
Check, Money Order, VISA, and Master-
card accepted.

*Commodore 64 is a registered trademark of Commodore Business Machines

Douglas Adams and Steve Meretzky

Designers Behind *The Hitchhiker's Guide To The Galaxy*

Sharon Darling, Research Assistant

The happy result of those two very different backgrounds is a microcomputer game version of the popular *Hitchhiker's Guide to the Galaxy*.

It took six years for Adams' original idea of a story about a guide to the universe—similar in nature to those books on how to travel the continent using one's thumb—to come to fruition. However, that idea, launched while Adams was hitchhiking through Europe, quickly snowballed from a simple concept into a long-lasting fad which has put such phrases as "don't panic" and "don't forget your towel" into the vocabulary of millions of people, first in England, and then in the United States.

The first volume quickly led to three other books: *The Restaurant at the End of the Universe*; *Life, the Universe and*

Take two minds that have created some very witty books and computer games, put them together, and what do you get? The zany game version of *The Hitchhiker's Guide to the Galaxy*.

Everything; and *So Long, and Thanks for All the Fish*.

Imagine yourself as hapless Arthur Dent, a mild-mannered Englishman who is quite fond of ale from the local pub. Upon groggily waking up one morning with a terrific headache from too much beer at that same pub, you discover that your house is scheduled to be demolished in order to make room for a new highway.

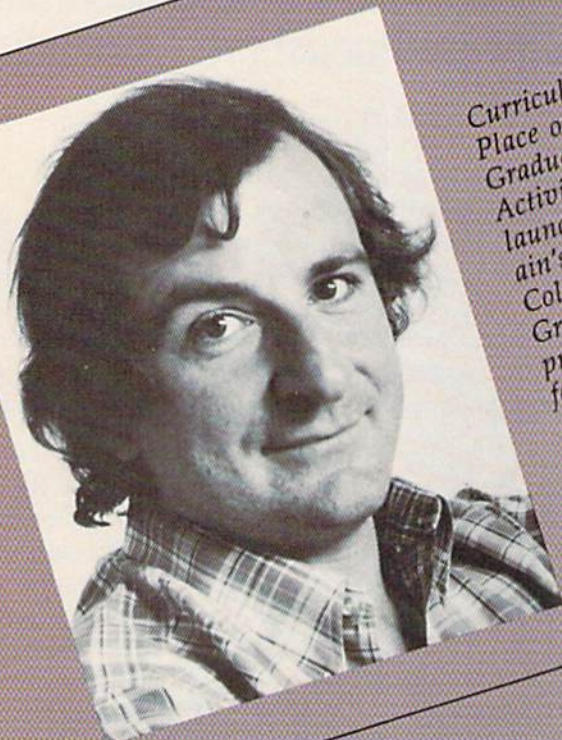
Little do you realize that that is the least of your worries today—for earth is scheduled to be destroyed, also—to make room for an intergalactic bypass.

From there you begin a

journey through the universe, accompanied by your friend Ford Prefect, a professed actor who is really a roving researcher for the *Guide* (a sort of computerized radio that's hooked into an encyclopedic database, very useful for hitchhikers). In reality, he's also an alien who hails from near the star Betelgeuse. Prefect's mission on Earth: To come up with a more detailed description of the planet than the two words contained in the *Guide's* current issue: "mostly harmless."

Since the game doesn't hinge on the action in the book, players don't need to have read *Hitchhiker's Guide* in order to play it, Meretzky says. "If you've read the book, it will probably make the first part of the game a bit easier for you, but that's about it," he adds.

But both Adams and Meretzky worked long and hard



Curriculum Vitae, Douglas Adams
Place of birth: England
Graduate, Cambridge University.
Activities: Footlights Club,
launching pad for many of Brit-
ain's great comics. Work history:
Collaborated with Monty Python's
Graham Chapman on several
projects; writer and script editor
for the TV series Dr. Who; cre-
ator of BBC radio serial, The
Hitchhiker's Guide to the Gal-
axy, which spawned four books, a
television series, two records, a
stage show, and a soon-to-be-
filmed movie.

*Curriculum Vitae, Steven
Meretzky*

Place of birth: United States
Graduate, Massachusetts Institute
of Technology (MIT), breeding
ground for many of Infocom's
computer game designers. Work
history: Before realizing his call-
ing as a computer game designer,
worked in construction project
management; started playtesting
games for Infocom in his spare
time. Eventually moved up to
writing games.

Game writing credits: Planetfall
and The Sorceror.



to make sure the game was faithful to the book, while at the same time turning it into a new adventure. What they did weave into the fabric of the game were detailed explanations of events that are mentioned only briefly in the book.

"In some ways it's easier, and in some ways, it's harder" to write a game from a book,

versus using an original concept, says Meretzky. "It's easier because you have some constraints on the universe you're going to be designing, and on the characters you're going to be using . . . and you don't have to come up with as many ideas.

"On the other hand, there's more of a challenge because you want to take advantage of the

features of an interactive game, and you don't want it to be just a translation of the book, because the book is necessarily linear. If it was just a translation," he adds, "there wouldn't be any reason to do it at all. You have to avoid getting into the trap of 'well, this is the way it was in the book, so this is the way it has to be in the game.' "

An Open Letter To The User Community

SPA 

Software Publishers Association

Dear User Group President and Bulletin Board Sysop:


Although the microcomputer software industry receives ample coverage by the media, the focus is generally on software and hardware developers and vendors. We frequently forget that there is another group of heroes that gets insufficient credit for promoting the growth of our unique industry. The Software Publishers Association, the trade association of over one hundred publishers of microcomputer software, salutes you, the user group president and bulletin board sysop, as an unsung hero. Space prohibits us from detailing the extent of your contribution to the growth of the microcomputer industry. Suffice it to say, however, that without the growth of hundreds of user groups and electronic bulletin boards, the industry would not be where it is today.

Just as user groups and electronic bulletin boards have promoted the growth of the industry, these same groups hold the key to the solution of one of the most difficult problems now facing the software industry—the unauthorized duplication and distribution of microcomputer software. The problem is not new. What is new, however, is the extent of the lawlessness involved. The law is clear. It is a violation of U.S. Copyright Law to reproduce software (except for purely personal archive purposes) without authorization. The penalties are also clear. Violators are subject to fines of up to \$50,000 and prison terms of up to five years. Since the violation of the copyright laws is a federal offense, the FBI has become increasingly involved in enforcing the law. The software industry has sought to deal with this problem in several ways. One has been an “arms race” of copy-protection systems. Another has been litigation against offending companies, user groups, and bulletin board operators.

There must be a better way for the software industry and the user group community to work together to protect everyone's rights. We seek a dialogue with leaders of user groups and bulletin board sysops. Let's hear from you. Please direct your comments to:

Department P
Software Publishers Association
Suite 1200
1111 19th Street, N.W.
Washington, D.C. 20036

Sincerely,


Kenneth A. Wasch
Executive Director

About the Software Publishers Association

Formed in April 1984 by leading publishers of microcomputer software, the SPA has grown to include more than 100 firms, representing all of the major segments of the microcomputer software industry: business, home, entertainment, and education. The members of the SPA recognize that the future health and growth of the microcomputer industry depends on establishing a partnership among all segments of that industry, including the most important segment—the computer user.

Members & Associate Members of the Software Publishers Association

- Activision, Inc.
Mountain View, CA
- Addison-Wesley
Reading, MA
- Allenbach Industries, Inc.
Carlsbad, CA
- Ashton-Tate Publications Group
Reston, VA
- Aspen Systems Corporation
Rockville, MD
- Atarisoft
Sunnyvale, CA
- Avant-Garde Creations, Inc.
Eugene, OR
- BNA Software
Washington, DC
- Bantam Software
New York, NY
- Blue Chip Software, Inc.
Canoga Park, CA
- R. R. Bowker Company
New York, NY
- Brockman Associates
New York, NY
- Broderbund Software, Inc.
San Rafael, CA
- CBS Software
Greenwich, CT
- Children's Television Workshop
New York, NY
- Cognetics
Princeton, NJ
- Columbia House
New York, NY
- COMPUTE! Publications
Greensboro, NC
- Computer Law Advisers
Springfield, VA
- Control Video Corporation
Vienna, VA
- Creative Software
Sunnyvale, CA
- DLM
Allen, TX
- Data Transforms, Inc.
Denver, CO
- Datamost, Inc.
Chatsworth, CA
- R. R. Donnelley & Sons Company
Stamford, CT
- Dow Lohnes & Albertson
Washington, DC
- Dvorak, John C.
Albany, CA
- Edicel
Paris, France
- Enter Magazine/Children's Television Workshop
New York, NY
- Epyx
Sunnyvale, CA
- First Star Software, Inc.
New York, NY
- Focus Media
Garden City, NJ
- Future Computing
Richardson, TX
- Grainger Electronic Publishing
New York, NY
- Harper & Row Software
New York, NY
- Harris Technical Systems, Inc.
Lincoln, NE
- Hayden Software
Cambridge, MA
- HesWare, Inc.
Brisbane, CA
- Hellman, D. W.
Eugene, OR
- Ibmcinc
New York, NY
- Imagic
Los Gatos, CA
- Infocom, Inc.
Cambridge, MA
- Information Systems, Inc.
Arlington, VA
- Information Technologies
Pittsburgh, PA
- International Accessories
Pawtucket, RI
- Krell Software Corporation
Stony Brook, NY
- Langenscheidt Publishers, Inc.
Maspeth, NY
- Language Arts, Inc.
Portland, OR
- The Learning Company
Menlo Park, CA
- Link Resources
New York, NY
- Macmillan Software
New York, NY
- Martech
Dallas, TX
- McGraw Hill Book Company
New York, NY
- Megahaus
San Diego, CA
- Microbits Peripheral
Albany, OR
- MicroLab
Highland Park, IL
- Millenium Group, Inc.
New York, NY
- Milliken Publishing Co.
St. Louis, MO
- Mindscape, Inc.
Northbrook, IL
- Minnesota Educational Computer Corp.
St. Paul, MN
- Origin Systems, Inc.
North Andover, MA
- Palantir
Houston, TX
- Penguin Software, Inc.
Geneva, IL
- Peter Norton Computing, Inc.
Santa Monica, CA
- PlayNet, Inc.
Troy, NY
- Prenice-Hall General Publishing
Englewood Cliffs, NJ
- Program Design, Inc.
Greenwich, CT
- ProtectIT Technology
New York, NY
- Quality Educational Designs, Inc.
Portland, OR
- Queue/Intellectual Software
Fairfield, CT
- Random House Electronic Publishing
New York, NY
- Reader's Digest Software
Pleasantville, NY
- STSC
Rockville, MD
- Scarborough Systems, Inc.
Tarrytown, NY
- Scholastic, Inc.
New York, NY
- Screenplay
Des Plaines, IL
- Sierra
Coarsegold, CA
- Electronic Publishing Division
Simon & Schuster
New York, NY
- Sofkat
Van Nuys, CA
- Software Access International
Mountain View, CA
- Software Trading Company
Westport, CT
- Softyme
San Francisco, CA
- SouthWest EdPsych Services, Inc.
Phoenix, AZ
- Southwestern Publishing
Cincinnati, OH
- Spinnaker Software
Cambridge, MA
- Springboard Software, Inc.
Minneapolis, MN
- Springer-Verlag New York, Inc.
New York, NY
- Strategic Simulations, Inc.
Mountain View, CA
- Taimis, Inc.
Chicago, IL
- Terrapin
Cambridge, MA
- Thomas, Wes
New York, NY
- Thom EMI
Costa Mesa, CA
- Thoughtware, Inc.
Miami, FL
- Tronix Publishing, Inc.
Inglewood, CA
- Unix Library
Palo Alto, CA
- Veronis, Suhler & Assoc.
New York, NY
- Wallsolt
New York, NY
- Warner Software
New York, NY
- John Wiley & Sons
New York, NY
- Williams & Wilkins
Baltimore, MD
- Xerox Education Publications
Middletown, CT
- Xerox Information Resources Group
Greenwich, CT
- Xor Corporation
Minnetonka, MN

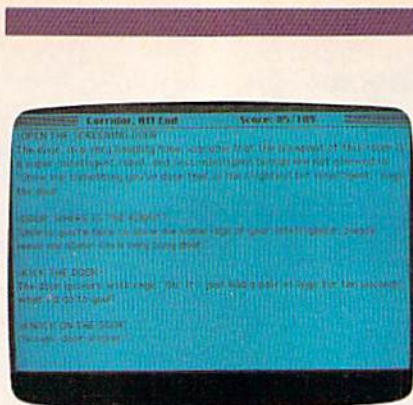
Tackling computer games was a new experience for Adams, even though he has Ford Prefect referring to the *Guide* as an electronic book, a familiar computer term today, but a new concept in 1977. "As far as I was concerned, it was completely imaginary," Adams says. "I didn't even become computer literate until about a year ago, whereupon it suddenly sort of swept over me like a tidal wave."

Author, humorist, and composer Christopher Cerf brought Adams and Infocom together. "I'd seen Infocom's games in detail, and one or two other adventure games briefly," Adams says. "I'd not been interested, but Infocom's were obviously a great deal better than the others—they'd been written with style, wit, and intelligence, and I just felt that here were guys on the same wavelength."

Adams' ideas about adapting a creative work in print form to video perhaps explains how *Hitchhiker's Guide* has maintained its integrity and style in all its various permutations. "Rather than just picking up a book and entering it into the computer, you have to go all the way back to the very jumble of ideas about what might be in it, just a sort of feeling about it."

"Then, you get interested in the medium, and explore that medium with some of those ideas in mind, rather than doing just straight text. The nice thing about *Hitchhikers*," he adds, "is it's not a concrete story, it's not particularly firm in any one medium—it's just a set of approaches and attitudes, with a few rough ideas about some characters."

That fluidity meant that there were several points in the book's story line where Adams and Meretzky could let their imaginations loose to create new situations for the game version. One thing that remained intact, though, was the humor inherent in the book.



"A lot of the same humor is explicitly there, just in the text of the game," Meretzky says. "Also, a lot of humor is created just by using the style of the game." For example, one command common to all Infocom games is "inventory," where you find out everything you are carrying at any particular moment. At the start of *Hitchhiker*, you are told that Arthur Dent's inventory consists of a) no tea, and b) a splitting headache.

One convention carried over from the book was footnotes, which are sprinkled throughout Adams' novel. "I thought there must be some way to incorporate [those] into the game," Meretzky recalls. "So what happens is, at various points in the text of the game, you'll see a reference to a footnote, and simply as your turn, you type in footnote 12, or whatever, and you get the text."

While some of the footnotes are straightforward, they can be amusing, such as one referencing a ray gun that never seems to work properly. "It's not a very good ray gun, is it?" the game responds to that footnote. "There's a lot of that, kind of taking a step back from the game and laughing at it from the outside," Meretzky says.

Putting British humor into perspective for an American audience never posed a problem, Adams says. "I tend to feel the

difference between English and American humor is much more apparent than real. I've never had the slightest problem in enjoying American humor. Everyone told me I was going to have immense difficulty in getting American audiences to respond to *Hitchhiker*, which has absolutely not been the case."

The book's humor has succeeded on both shores of the Atlantic perhaps because Adams didn't have any particular audience in mind, besides himself, when he wrote it in 1977. "Targeting something toward a particular audience, that's not something writers do, that's something that marketing or advertising people do," Adams feels. "I'm not selling toothpaste, I'm making ideas."

The process of translating those ideas from a novel to a computer game took about eight months, with Meretzky and Adams first meeting for about a week in Boston to map out the game's general direction. Then, Adams returned to England, and the two corresponded daily through electronic mail.

"When we had got a lot of it sitting there waiting to make sense, and not apparently being about to do that, Steve came over to England, and we hammered out answers to make it look as if the way it ended was what we'd intended all along," Adams recalls.

During the writing process, Meretzky says he tried to closely emulate Adams' style. Apparently, he succeeded, as Adams commented once that he couldn't tell whether he or Meretzky had written certain parts of the text.

As your game's journey continues, your survival depends on a very motley crew. Playing Arthur Dent, you've survived Earth's destruction by hitching a ride on a passing spaceship, but you're not sure that was really as lucky an occurrence as it first seemed. For now, your fate rests with two-

headed Zaphod Beeblebrox, president of the Imperial Galactic Government; his girlfriend, Trillian, whom you realize is the same girl you tried to pick up at a party recently; Ford Prefect; and Marvin, a paranoid android. Good luck.

Meretzky says one of the main reasons he was chosen to work with Adams was because of his previous work with comic science fiction in *Planetfall*, an award-winning game. He was also a *Hitchhiker* fan, as were most of the folks at Infocom.

The two started out their collaboration by following the plot of the book closely. Then, "I guess he (Adams) got used to the idea of writing interactively, and the more I got used to the idea of giving him ideas and of working with him, the more the ideas started to flow," Meretzky says. "By the end, we had way more ideas than we were able to use."

All those extra ideas that never made it into the game are "definitely" enough for a sequel, Meretzky adds. However, don't necessarily look for a fifth book in the *Hitchhiker* saga, Adams says. He claims the recently released fourth novel is the "final, final, final one. There is definitely, definitely, definitely not another one after this—at least not for a while."

But don't panic. Audiences both here and abroad have not heard the last from Adams. After filming is completed on the movie version of *Hitchhiker's Guide*, he says his next project will probably be a screenplay. A novel based on that movie will be written afterward, he says.

And Meretzky also has more games up his sleeve. While he's got some science fiction game ideas in mind, he's also contemplating a mystery game, which would be a new area for him.

Until then, enjoy your journey through the galaxy. And don't forget your towel.

Make your '64 work fulltime

MAKE YOUR OWN CHARTS... CHARTPAK-64

Produce pro-quality charts and graphs instantly in 8 chart formats. Hardcopy in two sizes to popular dot matrix printers. **\$39.95**



DETAIL YOUR DESIGNS... CADPAK-64

Superb lightpen design tool. Draw LINES, BOXES, CIRCLES, ELLIPSES; pattern FILLING; freehand DRAW; COPY sections of screen; ZOOM; more. Hardcopy. **\$49.95**



CREATE SPREADSHEETS & GRAPHS POWER PLAN-64

Powerful spreadsheet with builtin graphics. 275 pp. manual, tutorial, help, format, cell protect, much more. **\$49.95**

Commodity	Unit	Price	Quantity	Total
1	Sales	Jan	100	100.0
2	Distributions	Jan	20	20.0
3	Materials	Jan	20	20.0
4	Net Profit	Jan	20	20.0
5				
6				
7				
8	Expenses			
9	Materials	8.2	1.2	9.84
10	Office	2.8	2.8	7.56

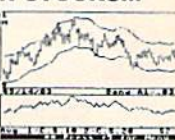
ORGANIZE YOUR DATA... DATAMAT-64

Powerful, data management package. Free form screen design. Complete flexible reporting, sorting, selection. More. **\$39.95**

Item Number	Description	Onhand	Price	Location	Record Pt.	Record, Gt	Cost

CHART YOUR OWN STOCKS... TAS-64

Sophisticated technical analysis charting package. 7 moving averages. 3 oscillators, trading bands. **\$84.95**



Other titles available. FREE CATALOG and name of nearest dealer, write or call (616) 241-5510.

For postage and handling, include \$4.00 (\$8.00 foreign) per order. Money Order and checks in U.S. dollars only. Mastercard, VISA and American Express accepted. Michigan residents include 4% sales tax.

You Can Count On **Abacus Software**

P.O. Box 7211 Grand Rapids, MI 49510 - Telex 709-101 - Phone 616/241-5510

64-ACCOUNTING

Complete • Fast • Easy

The 64-Accounting System was specifically designed to do your personal and small business accounting faster, easier and more completely than any other program on the market. And it does!

- Financial Statements
- Detailed Trial Balance
- Check Writing
- Statement Printing
- Checkbook Reconciliation

Take the guesswork out of the numbers game. Order or receive additional 64-Accounting information today! **\$69.95**

Dealer Inquiries Welcome

Call **1-800-553-0002**
In Iowa, **1-800-772-5771**

SOFTWARE DESIGN, INC.

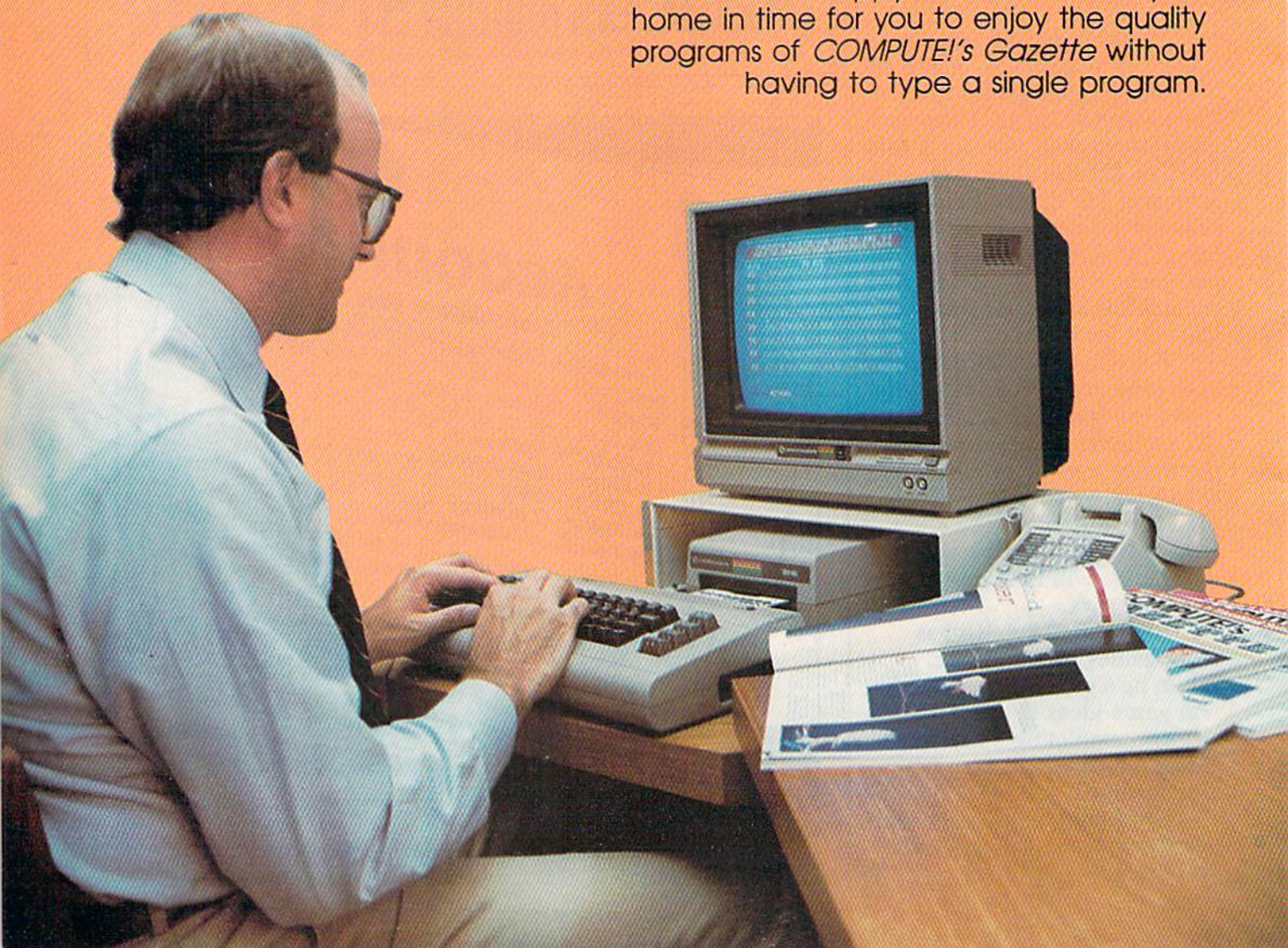
1945 Mitchell Avenue • P.O. Box 570 • Waterloo, Iowa 50704

COMPUTE!'s *Gazette Disk*

Now you can enjoy the exciting programs
from *COMPUTE!'s Gazette* on a
ready-to-run disk

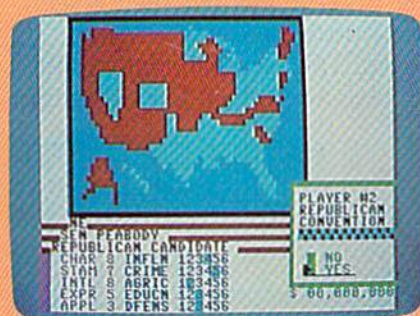
Every month you can receive *COMPUTE!'s Gazette Disk*, which includes the fascinating and challenging programs published in the corresponding issue of *COMPUTE!'s Gazette*, ready to load on your Commodore 64 or VIC-20.

The 5¼-inch floppy disk will arrive in your home in time for you to enjoy the quality programs of *COMPUTE!'s Gazette* without having to type a single program.



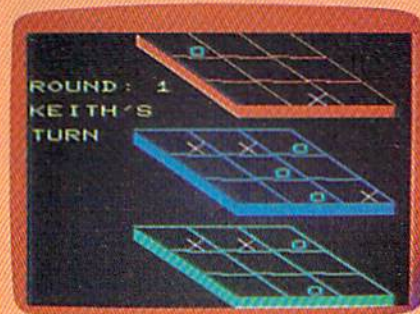
Timesaving

Using *COMPUTE!'s Gazette Disk* saves you time. Instead of spending hours typing in each program from *COMPUTE!'s Gazette*, you can load all the fun and fascinating programs in just a few minutes with the *Disk*. You have more time to enjoy Budgeteer, Mystery at Marple Manor, Vocab Builder, and many other exciting games and applications.



Inexpensive

And *COMPUTE!'s Gazette Disk* is inexpensive, only \$69.95 for a one-year subscription. That means the *Disk* costs you \$5.83 a month, a savings of 55 percent off the single disk price of \$12.95. And what price can you put on the hours of typing time you save?



**COMPUTE!'s
GAZETTE DISK**

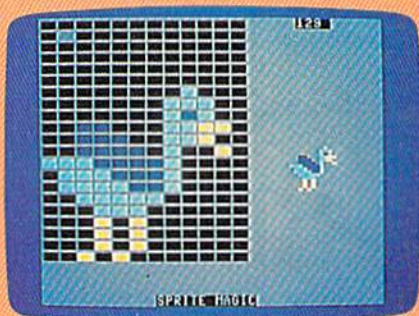


Risk-Free

All *Disks* are fully tested before they're shipped to you. And full documentation for all programs is in the corresponding issue of *COMPUTE!'s Gazette*. But if you should have a problem with a disk, just call toll free 800-334-0868 and a member of our Customer Service Staff will assist you.

Convenient

COMPUTE!'s Gazette Disk gives you access. As soon as you read about a new and challenging program in *COMPUTE!'s Gazette*, you can load the *Disk* and begin using it immediately—the *Disk* is ready when you are.



Enjoy the quality programs from *COMPUTE!'s Gazette* on the convenient, ready-to-use *COMPUTE!'s Gazette Disk*.

To order *COMPUTE!'s Gazette Disk*

Call toll free **800-334-0868** (in NC call **919-275-9809**) or mail your prepaid coupon to *COMPUTE!'s Gazette Disk*, P.O. Box 901, Farmingdale, NY 11737

YES! I want to save time and money. Please enter my subscription to *COMPUTE!'s Gazette Disk*.

Save 55% off the single issue price. 1 year subscription, \$69.95

Save even more! 2 year subscription, \$129.95

All *Disk* orders must be prepaid.

Payment enclosed (check or money order)

Charge MasterCard Visa American Express

Acct. No. _____ Exp. Date _____

Signature _____

Name _____

Address _____

City _____

State _____ Zip _____

(Outside U.S. and Canada, add \$36.00 per year for shipping and handling.)

Please allow 4-6 weeks for delivery.

353D02

✱ for
64
-
type

Pool

Joseph T. Woyton

Chalk up your cue stick and sharpen your skills with this exciting simulation of pocket billiards. For one or two players. Originally written for the unexpanded VIC, we've added a version for the 64.

The rules of "Pool" are simple—you try to sink the billiard balls on the table by aiming and shooting the white cue ball.

The VIC version accepts either keyboard or joystick input (for details on how to play 64 Pool, see the programmer's notes accompanying this article). Use the joystick (or f3 key) to rotate the cue stick around the cue ball. Shoot it by pressing and *holding* the fire button (or f1). The longer you hold it down, the softer the shot. For a hard shot, release the button or key immediately.

Your turn continues as long as you keep pocketing balls. If you miss or scratch, your opponent takes over (if you're playing solo, try playing left against right hand). After a scratch, the cue ball may be positioned anywhere behind the scratch line using the joystick (or f3 and f5). Once you've selected a spot, tap the fire button (or f1) and continue playing.

The 15 balls are randomly placed after the last ball is sunk. You can then continue the game (up to a mutually agreeable limit) or respond to the prompt for a new game.

VIC Program Description

The main play routine of the program makes the billiard balls move, carom, and collide. In this routine, motion is simulated by POKEing a ball character to the next screen position in the direction of travel, and then POKEing a blank space to the previous position, erasing it. The resolution of the VIC's screen permits only eight directions of movement.

The program PEEKs ahead for upcoming collisions. When the edge of the table is reached,

the direction of travel is reversed. When pockets (CHR\$(102)) are detected, the scoring subroutine is called.

The ball slows down as it travels by using progressively longer time delays between screen POKEs. Sound effects punctuate ball impact, scoring, and turnovers. The REMark statements should help you follow the flow of the program.

VIC Program Variables

A	=	character under cue stick
B	=	current ball character
B0	=	cue ball, CHR\$(87)
B1	=	object ball, CHR\$(81)
C	=	player code; +1 for player A, -1 for player B
D	=	ball velocity time delay
H	=	1 for hit pocket, 0 for no score
I	=	ball direction increment
J	=	joystick input
K	=	keyboard input
P	=	ball placement during table setup
Q	=	current ball location
Q0	=	cue ball scratch location
QC	=	cue ball play location
SA	=	player A score
SB	=	player B score
T	=	sound effect time delay
V	=	cue stick or cue ball vector
Z	=	cue stick character

Entering VIC Pool

Almost all of the unexpanded VIC's memory is used for the program and variables. Do not add any unnecessary spaces. REM statements mark the beginning of subroutines; don't delete them unless you change the GOSUBs accordingly.

If you prefer not to type in the program, I'll make a copy of the VIC version on tape on receipt of a blank tape (sorry, no disks), a pre-stamped mailer, and \$3.

Joseph Woyton
106 Braddock Drive
Mauldin, SC 29662

See program listings on page 124.

FOR THE APPLE® & COMMODORE 64™

Presenting a new strategy arcade game —
where the dark dungeon-maze of the Netherworld
holds nightmarish adventure, nonstop action
and heart-pounding excitement for you,

GEMSTONE WARRIOR™

Finely-honed combat skills may defeat the hordes of hellish monsters, but sharp wits are needed to map the torturous passages if you are to succeed in your quest for the Gemstone!

Find and store treasures and magic items to help you along the way. Learn well the properties of each magic item: You may have only seconds to use one to save your life!



On 64K disk for the Apple II with Applesoft ROM, II+, IIe, and IIc.
On 64K disk for the Commodore 64.
Uses keyboard/joystick controls.



Search for this game at your local software/computer or game store today!



STRATEGIC SIMULATIONS, INC.

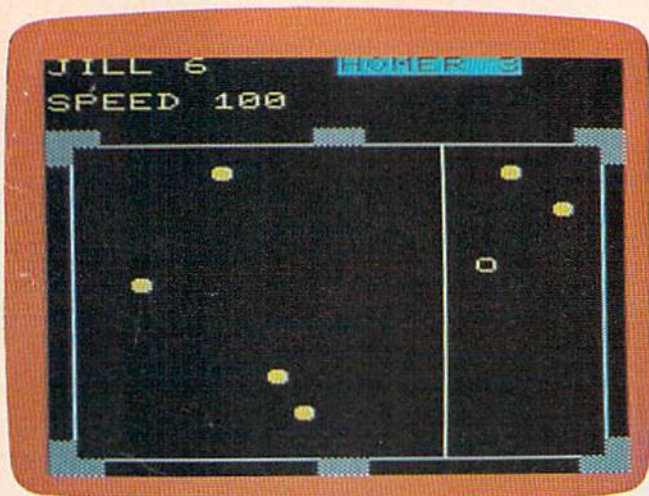
If there are no convenient stores near you, VISA & Mastercard holders can order this \$34.95 game direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. Please add \$2.00 for shipping and handling.

To order by mail, send your check to: STRATEGIC SIMULATIONS, INC., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043. (California residents, add 6.5% sales tax.) All our games carry a "14-day satisfaction or your money back" guarantee.

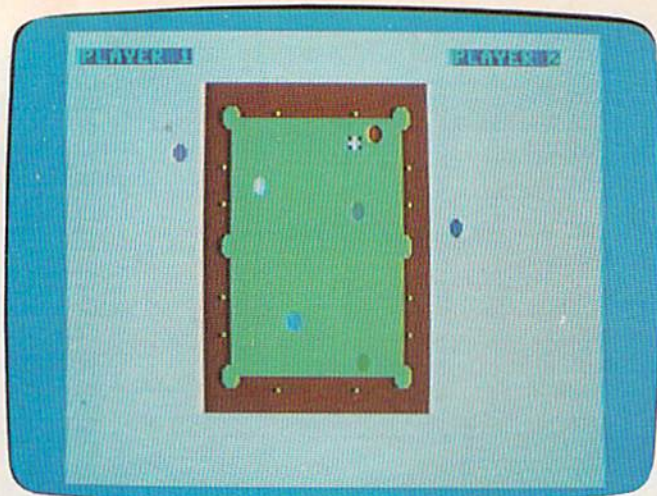
WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

APPLE and COMMODORE 64 are trademarks of Apple Computer, Inc. and Commodore Electronics, Ltd., respectively.

© 1984 by Strategic Simulations, Inc. All rights reserved.



After a scratch, the cue ball is placed anywhere behind the line (VIC version).



Player 2 carefully plans a shot—red ball in the corner pocket. (64 version).

Programmer's Notes: 64 Pool

Kevin Mykytyn, Editorial Programmer

Rather than translating the VIC version directly to the 64, an entirely new high-resolution Pool was written. It requires a joystick (two joysticks in the two-player version).

The 64 version is written entirely in machine language, so MLX is required to type it in. If you do not have a copy of MLX (published periodically in the GAZETTE), type it in and save it to tape or disk. Then run it, and enter the following information:

Starting Address: 49152

Ending Address: 52905

When you've finished, save the program. Load it back into the computer using a secondary address of 1: **LOAD "POOL",8,1** (disk) or **LOAD "POOL",1,1** (tape). **SYS 49152** starts the program.

The title screen comes up first, with a ragtime melody playing in the background. You choose a one- or two-player game. The screen clears and the pool table appears.

At the start of the game, the white cue ball is at one end of the table and six balls are arranged at the other end. There are six (rather than 15) because only eight sprites are available on the 64. Using the joystick, position the cue ball in the "kitchen," behind the scratch line. When you're ready to shoot, press the joystick button once. A crosshair appears on top of the cue ball.

Move the crosshair in the direction you want to shoot. Unlike the VIC version, which has eight directions of movement, 64 Pool al-

lows you to shoot in any direction. Pressing the joystick button starts the cue ball rolling.

The distance between the cue ball and crosshair determines the strength of the shot. The farther away, the harder the shot. There is a limit on how far you can move the crosshair (approximately two-thirds the length of the table). On the initial break, you'll probably want to shoot hard. On later turns, the strength of the shot will determine how far the cue ball travels after a collision. Strategic soft shots can help you set up the table for the next shot.

The goal in the one player game is to clear the table in the fewest number of shots (the record here at COMPUTE! Publications is eight). When all balls are in the pockets, you're ranked according to your ability, from Pro (the best) to Pool Shark, Amateur, and Novice.

In the two-player game, you try to outshoot your opponent. When you sink a ball, it's placed on your side of the screen. With six balls in play, tie games are possible.

A scratch occurs when you knock the cue ball into a pocket, or when the cue ball doesn't hit anything before coming to a stop. You lose your turn, one of the balls to your credit is put back on the table, and the cue ball is placed in the starting position. Your opponent can then put the cue ball anywhere behind the scratch line.

64 Pool does not completely follow the laws of physics, although it offers a realistic simulation. The sprites are moved pixel by pixel, but the movement is calculated in 256ths of a pixel for increased accuracy. ©

"The **DICTATOR** Strikes Back!"

Their only hope was your promise to bring them home!



Now Playing!

BEACH-HEAD II™

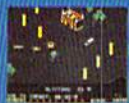
The continuing saga pits allied forces against the cruel dictator who escaped the destruction of the fortress with portions of his army and prisoners captured during the land battle.

A true "head to head" two player game with voice simulation and superb multiscreen graphics. Produced for the **COMMODORE 64** and coming to a Computer Store near you!

PG PLAYS GREAT Some material may not be suitable for Pre-Schoolers

Written by Roger & Bruce Carver Directed by Bruce Carver Produced by Chris J. Jones Distributed by David L. Ashby
Cinematography: Marjorie Nerdin Production Assistant: Audree Jones Casting: Jean Miner Special Effects: Kathryn Ashby Promotion: Connie Stringham Executive Production: Kevin L. Jones & Associates
Voices: Electronic Speech Systems Illustrations: Doug Van De Grift Based upon the book "The Goliath Syndrome" by James L. Slade

ACCESS™
Software Incorporated



Raid Over Moscow

Beach-Head

Commodore 64 is a registered trademark of Commodore Business Machines

COMMODORE 64

Look for these additional Access Productions
Copyright 1985 Carver & Associates, Inc. All rights reserved

Apple Hunt

James Arlet

Speed is important, but good strategic moves will ensure success in this clever game for the VIC and 64. A joystick is required.

As the main character in "Apple Hunt," you find yourself in a forest with apples scattered here and there. Your job is to eat as many as you can. However, you must avoid the trees and the moving monster, who is fond of devouring everything—apples, trees, and you. You're also working within a time limit, so lengthy pauses to study the situation are not advisable. The key to success in this game is to think before you move—but don't think too long.

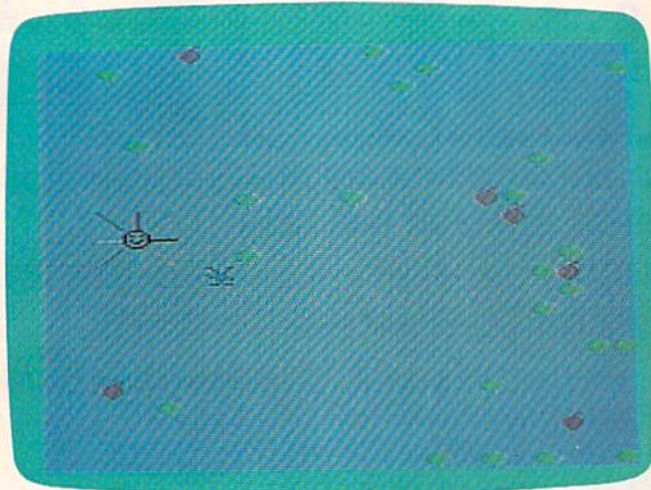
Your sole weapon in this game is the "zap," which clears out everything in the adjacent eight screen locations. It's activated by pressing the fire button. You can use it to clear out trees to get to

an apple or use it to zap the monster. Occasionally, a ruby appears on the screen. You must try to get it before the monster does—it's worth a lot of points.

Game Play

When you run the program, you'll be asked if you want game instructions. Press Y to read them, N to get right to the game. Using a joystick (port 2 for the 64), move your man toward the apples or ruby, and use your fire button to "zap." Notice that you can wrap around the screen from all four sides—a feature you'll need to use.

You begin with two men and two zaps in wave 1. To complete each wave, you must eat five apples, pick up a ruby, or zap the monster—any of these within the time limit. Each new wave includes more trees, making maneuvering progressively more difficult. Before the time expires, the screen will flash red indicating a few seconds left. Using a zap (if you haven't used both of them) resets the time to zero for that wave. If you eat four or less apples, then lose a life, those collected carry over to the next wave. This does not happen if you collect a ruby or zap the monster.



An unsuccessful attempt to "zap" the monster (VIC version).

VIC Notes

The VIC version of Apple Hunt is in two parts. Type in Program 1, "Redefined Characters," and save it. Then enter Program 2 and save it with the filename "P2". Tape users should save Program 2 immediately after the first. Disk users should change the 1 to an 8 in line 470 of Program 1, and delete line 450.

Educational Software
That Works:

Spell.

Spell It!

Spell expertly 1000 of the most misspelled words. Learn the spelling rules. Improve with 4 exciting activities, including a captivating arcade game! Add your own spelling words.

ages 10 — adult / 2 disks: \$49.95



Math.

Math Blaster!

Master addition, subtraction, multiplication, division, fractions, decimals and percentages — by solving over 600 problems. Learn your math facts with 4 motivating activities, including a fast-action arcade game! Add your own problems.

ages 6 — 12 / 2 disks: \$49.95

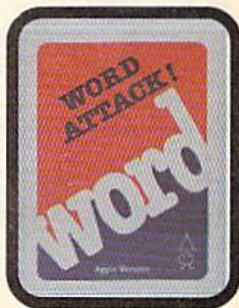


Word.

Word Attack!

Add 675 new words to your vocabulary — with precise definitions and sentences demonstrating usage. Build your skills with 4 fun-filled activities, including an arcade game! Add your own words.

ages 8 — adult / 2 disks: \$49.95



Read.

Speed Reader II

Increase your reading speed and improve comprehension! Six exercises designed by reading specialists vastly improve your reading skills. Chart your own progress with 35 reading selections and comprehension quizzes. Add your own reading materials.

high school, college & adult / 2 disks: \$69.95



The Davidson Best Seller Tradition.

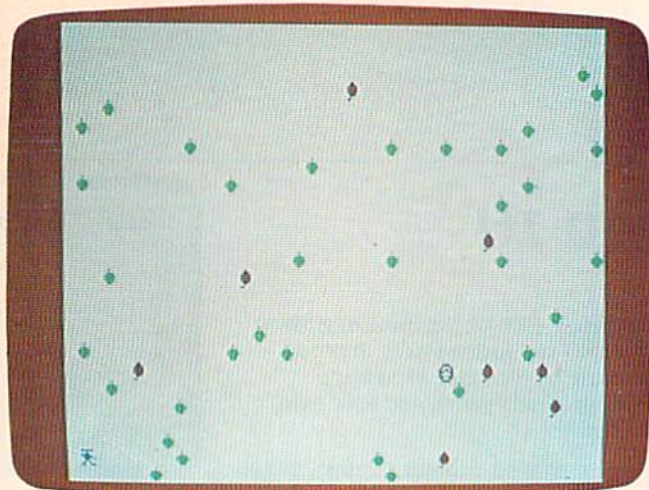
For your Apple, IBM or Commodore 64.
Ask your dealer today.

For more information call: (800) 556-6141
In California call: (213) 373-9473

Davidson & Associates, Inc.
6069 Groveoak Place # 12
Rancho Palos Verdes, CA 90274

 *Davidson.*





Moving left toward the apples (64 version).

Points are awarded as follows: 50-500 for apples, 1000 for zapping the monster, and 3000 for a ruby. Bonus points are given according to how fast you complete a wave. If you finish a wave *after* the screen flashes red, no bonus points are given. Also, an extra man and an extra zap are given after completing waves 5, 10, 15, 20, and 25. The highest score to date is 104,753.

See program listings on page 133.



NEW

CHORD-POWER FOR GUITAR

THIS DELUXE REFERENCE FEATURES:

- Quick Access to Over 8,000 Chords With Sound
- Chords Displayed on Color Graphic Guitar Fretboard with Each Note Played
- Chord Formulas Displayed Showing Corresponding Notes
- For Beginner to Professional
- Easy and Fun to Use - Just Enter Chord Desired and it Will be Displayed and Played

In addition to being an excellent chord reference, **CHORD-POWER** will help unravel the mysteries of chord construction and advance your chord and solo playing!

- Program Runs on C-64* With Disk Drive -

ORDER TODAY! Check, Money Order or C.O.D.

\$39.95 Plus \$2.00 Shipping and Handling.
CA residents add 6% Sales Tax.

NewArts Co.

P.O. BOX 2700, HUNTINGTON BEACH, CA 92647
(DEALER INQUIRIES INVITED)

*C-64 IS TRADEMARK OF COMMODORE BUSINESS MACHINES, INC.

STEVE PUNTER'S NEWEST C-64 WORD PROCESSOR

FEATURING:

- 40 to 160 column video display
- Single pass double column output
- 100% proportional printing capability
- Double sided printing with margin offsets
- Over 30 printers fully supported
- "Bump free" loading - MSD - 2 compatible
- Automatic spelling corrections with Spellpro™

49⁹⁵

Toll Free Order Line

1-800-387-3208



**PRO-LINE
SOFTWARE**

755 The Queensway East, Unit 8, Mississauga, Ontario, Canada L4Y 4C5 . Phone 416-273-6350

A Printer For All Reasons

Search For The Best High Quality Graphic Printer

If you have been looking very long, you have probably discovered that there are just too many claims and counter claims in the printer market today. There are printers that have some of the features you want, but do not have others. Some features you probably don't care about, others are vitally important to you. We understand. In fact, not long ago, we were in the same position. Deluged by claims and counter claims. Overburdened by rows and rows of specifications, we decided to separate all the facts — prove or disprove all the claims to our own satisfaction. So we bought printers. We bought samples of all major brands and tested them.

Our Objective Was Simple

We wanted to find that printer which had all the features you could want and yet be sold directly to you at the lowest price. We wanted to give our customers the best printer on the market today at a bargain price.

The Results Are In

The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the GP-550CD from Seikoshia, a division of Seiko (manufacturers of everything from wrist watches to space hardware). We ran this printer through our battery of tests and it came out shining. This printer can do it all. Standard draft printing up to a respectable (and honest) 86 characters per second, and with a very readable 9 (horizontal) by 8 (vertical) character matrix. At this rate, you will get an average 30 line letter printed in only 28 seconds.

"NLQ" Mode

One of our highest concerns was about print quality and readability. The GP-550CD has a print mode termed Near Letter Quality printing (NLQ mode). This is where the GP-550CD outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 9 (horizontal) by 16 (vertical). This equates to 14,400 addressable dots per square inch. Now we're talking *quality* printing. You can even do graphics in the high resolution mode. The results are the best we've ever seen. The only other printers currently available having resolution this high go for \$500 and more *without* the interface or cable needed to hook up to your Commodore!

Features That Won't Quit

With the GP-550CD your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 18 font styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print H_2O or X^2 . This fantastic machine will do it automatically, through easy software commands right from your keyboard. All fonts have true descenders.

One of the fonts we like best is "Proportional" because it looks most like typesetting. The spacing for thin characters like "i" and "l" are given less space which "tightens" the word making reading easier and faster. This is only one example of the careful planning put into the GP-550CD.



Do you sometimes want to emphasize a word? It's easy, just use **bold** (double strike) to make the words stand out. Or, if you wish to be even more emphatic, underline the words. Or do both. You may also wish to "headline" a title. Each basic font has a corresponding elongated (double-wide) version. You can combine any of these modes to make the variation almost endless. Do you want to express something that you can't do with words? Use graphics with your text — even on the same line.

You can now do virtually any line spacing you want. You may select 6, 8, 7½ or 12 lines per inch. PLUS you have variable line spacing of 1.2 lines per inch to infinity (no space at all) and 97 other software selectable settings in between. You control line spacing on a dot-by-dot basis. If you've ever had a letter or other document that was just a few lines too long to fit a page, you can see how handy this feature is. Simply reduce the line spacing slightly and... VOILA! The letter now fits on one page.

Forms? Yes! Your Letterhead? Of Course!

Do you print forms? No problem. This unit will do them all. Any form up to 10 inches wide. The tractors are adjustable from 4½ to 10 inches. Yes, you can also use single sheets. Plain typing paper, your letterhead, short memo forms, anything you choose. Any size under 10" in width. Multiple copies? Absolutely! Put forms or individual sheets with carbons (up to 3 deep), and the last copy will be as readable as the first. Spread sheets with many columns? Of course! Just go to condensed mode printing and print a full 136 columns wide. Forget expensive wide-carriage printers and changing to wide carriage paper. You can now do it all on a standard 8½" page.

Consistent Print Quality

Most printers have a continuous loop ribbon cartridge or a single spool ribbon which gives nice dark printing when new, but quickly starts to fade after a while. To keep the printers' output looking consistently dark, the ribbons must be changed more often than is healthy for the pocketbook. The GP-550CD solves this problem completely by using a replaceable, inexpensive ink cassette which is separately replaceable from the actual ribbon. It keeps

the ribbon loaded with ink at all times. You only replace the ribbon when it truly wears out, not when it starts to run low on ink. Just another example of the superb engineering applied to the GP-550CD. (When you finally do wear out your ribbon, replacement cost is only \$10.95. Ink cassette replacement cost is only \$5.95, both postpaid.)

The Best Part

When shopping for a quality printer with all these features, you could expect to pay around \$500 or more. *Not any more!* We have done our homework. You don't have to worry about interfaces or cables. Everything is included. We are now able to sell this fantastic printer for only \$259.95! The GP-550CD is built especially for the Commodore 64, VIC-20, Plus 4 and C-16. All Commodore graphics are included. This printer does everything the Commodore printers do but has more features. You need absolutely nothing else to start printing — just add paper. We also have specific models for other computers. Call for details.

No Risk Offer

We give you a 15-day satisfaction guarantee. If you are not completely satisfied for any reason we will refund the full purchase price. A 1-year warranty is included with your printer. The warranty repair policy is to repair or replace and reship to the buyer within 72 hours.

The Bottom Dollar

The GP-550CD is only \$259.95. Shipping and insurance is \$8.00 — UPS within the continental USA. If you are in a hurry, UPS Blue (second day air) is \$18.00. Canada, Alaska, Mexico are \$25.00 (air). Other foreign is \$60.00 (air). California residents add 6% tax. These are cash prices — VISA and MC add 3% to total. We ship the next business day on money orders, cashiers' checks, and charge cards. A 14-day clearing period is required for checks.

TO ORDER CALL TOLL FREE

1-(800) 962-5800 USA
or 1-(800) 962-3800 CALIF.

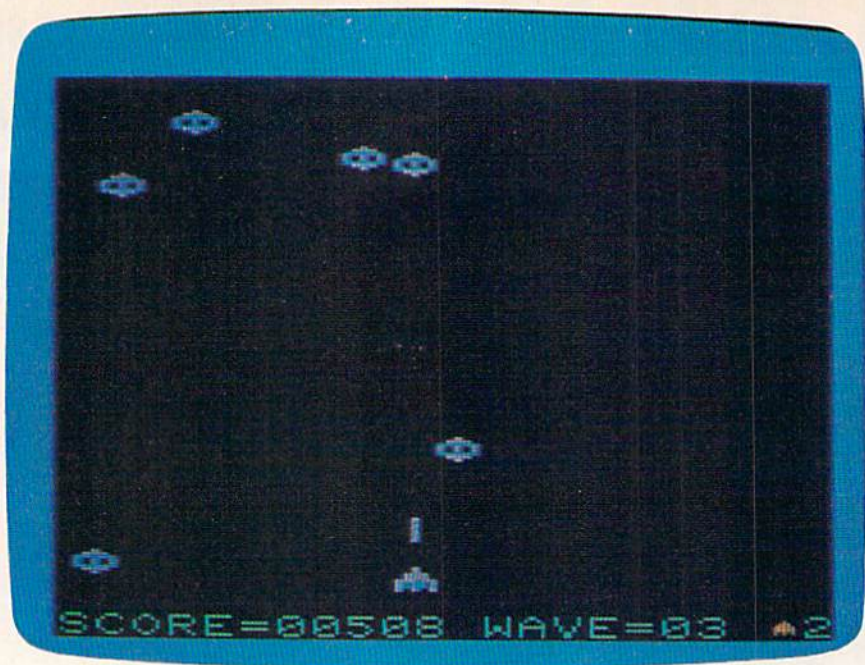
or send payment to:

APROPOS TECHNOLOGY

1071-A Avenida Acaso
Camarillo, CA 93010

Technical Info: 1-(805) 482-3604

©1984 APROPOS TECHNOLOGY



It's hard to hit the wildly bouncing spaceships in "AstroPANIC!"

Astro-PANIC! For The VIC

Sean D. Wagle

In the February 1984 GAZETTE, we published Charles Brannon's "Astro-PANIC!" for the 64, a popular game with our readers. Sean D. Wagle, a 16-year-old programmer, has created a version for the VIC. It's all machine language, and is faithful to the original 64 version. We think you'll be surprised at this unique programming accomplishment. The program has smooth and lightning-quick movement, excellent playability, and sprite emulation—all on the unexpanded VIC. A joystick is required.

As the name implies, "Astro-PANIC!" is a frantically paced space game. The pace gets faster and faster the longer you're able to survive. The object is simple: With a joystick, you must defend your cannon, at the bottom of the screen, by maneuvering it left and right while trying to destroy a fleet of alien saucers which dodge and dive unpredictably in a furious attack. You have only three ships (two in reserve at the start of the game), and there are 15 levels, each increasingly difficult. Your goal is to make it

through Level 15. If this challenge is too much initially, you can play for the highest score.

If you survive through Level 15, the game loops back to Level 1, where the pace slows down. Only a few will make it this far, however. If you wish to pause the action, press the SHIFT LOCK key. Press it again to resume play. To begin a new game at any time, press any alphabetic key.

Typing In The Game

Astro-PANIC! is written entirely in machine language and requires VIC MLX (published in alternate months in the GAZETTE) to type in. After entering and saving VIC MLX (8K or greater required), turn off your computer, but leave the memory expander inserted. Now, turn your VIC back on and type **POKE 44,30:POKE 7680,0:NEW**. Load MLX and type **RUN**. At the starting and ending address prompts, enter 4608 and 7679, respectively. Next, type in Astro-PANIC! and save it. Turn off your computer, remove the expansion cartridge, and then load the game with this format: **LOAD "filename",8,1** (for disk) or **LOAD "filename",1,1** (for tape). To start, type **SYS 6560**.

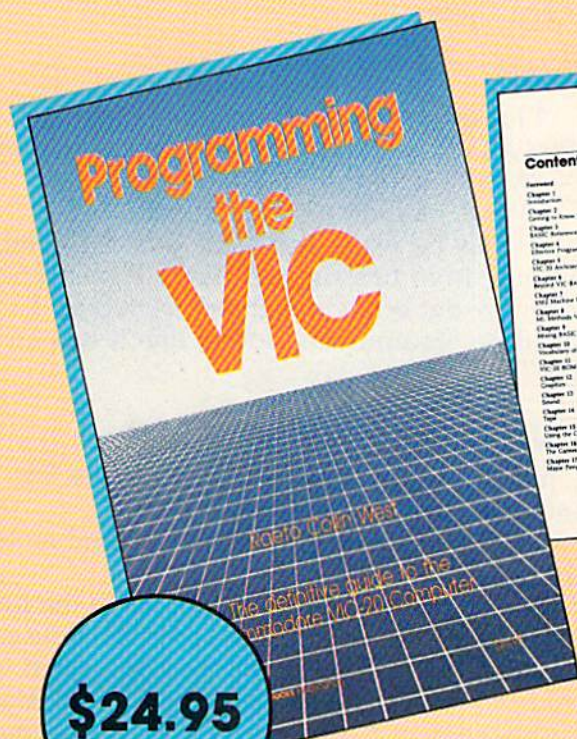
See program listing on page 130.

Vic-20 Owners

The ultimate reference book

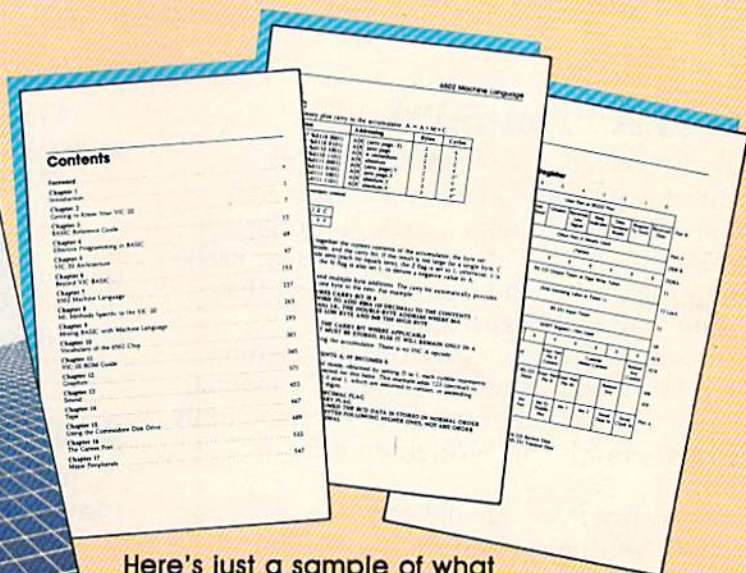
The complete encyclopedia for the Commodore VIC-20, is now available. COMPUTE! Books, one of the leading publishers of application-oriented consumer computer books, has released *Programming the VIC* by Raeto Collin West. And this extraordinary volume is only \$24.95.

Now you can own the *definitive* book on the VIC-20. There has never been a book published for the VIC-20 that gives you what this one does.



\$24.95

Programming the VIC
Raeto Collin West
\$24.95
ISBN #0-942386-52-3
608 pgs.
paperbound



Here's just a sample of what *Programming the VIC* includes:

- Detailed descriptions of every BASIC command in the VIC's vocabulary
- Discussions and examples of BASIC and machine language programming techniques
- Comprehensive guides to VIC sound and graphics
- A thorough mapping of the VIC-20's ROM
- An annotated list of 6502 opcodes
- A practical guide to selecting and using printers, plotters, and modems

Programming the VIC's 17 chapters address virtually every programming situation that you, a VIC user, are likely to encounter. The book contains hundreds of examples and dozens of complete programs published in ready-to-type-in form.

Beginning to advanced programmers alike will find *Programming the VIC* to be an indispensable VIC resource. Whatever your programming level and whatever your VIC needs, this is a book that you'll refer to again and again.

Mail your prepaid coupon to: COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403 or call 1-800-334-0868

Yes! Send me _____ copies of *Programming the VIC* at \$24.95 per copy.

All orders must be prepaid in U.S. funds. Add \$3.00 shipping & handling per book. _____
N.C. Residents add 4.5% sales tax. _____
Total payment enclosed. \$ _____

Payment enclosed (check or money order).
 Charge my Visa MasterCard American Express

Acct. No. _____ Exp. Date _____

Name _____
Address _____
City _____ State _____ Zip _____

Please allow 4-5 weeks for delivery. 752523G

COMPUTING for families

The World Of Mimi The Ant

Fred D'Ignazio, Associate Editor

What Is A "Fourmi"?

Recently I received a letter from Monique Gosselin of Logidisque in Montreal, Canada. Monique asked me to take a look at a program called *Mimi* by Anne Bergeron. *Mimi* is an early-learning program for the Commodore 64 that Logidisque had just begun shipping.

I unpacked the program from the mailing wrapper, but when I saw the program's manual, I panicked. The manual was short enough—only eight pages—but it was written entirely in French.

Luckily, my five-year-old son Eric was hanging around, and he spotted the cartoon on the front of the documentation. It looked like a little child playing a flute. Except that the child had antennas.

"What's that?" Eric asked.

"I don't exactly know," I told Eric. "Except I don't think it's human."

I looked at the directions. The program's title said, "MIMI: Les aventures de Mimi la fourmi."

"Mimi's a 'fourmi,'" I told Eric.

"What's a fourmi?" Eric asked.

I knew he would ask that. "Just a second," I told him. I ran upstairs and dug a French-English dictionary out of my daughter's bookcase. I looked up "fourmi" and found that it was an "ant."

A Visit To Mimi's World

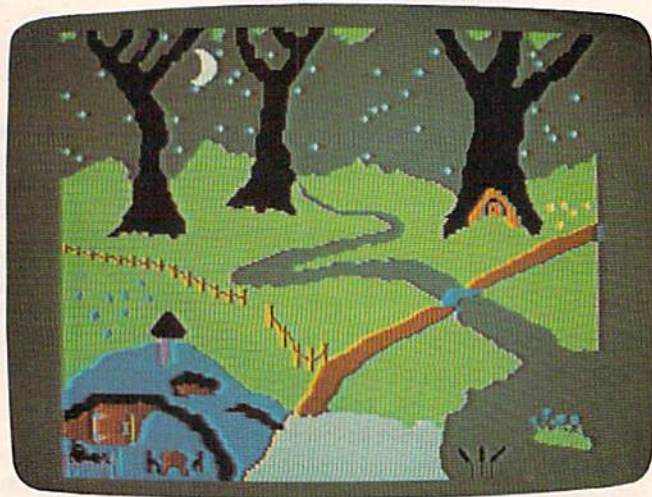
"C'mon," I told Eric, when I returned to the computer. "Let's take a look at Mimi."

Eric and I booted the *Mimi* disk and entered Mimi's world.

Mimi's world was quite simple. At the lower lefthand side of the screen was Mimi's house. The house was cut away on the side so that we could see in. A pathway led from Mimi's house to a bridge over a tiny stream. Past the stream



Day ("jour") . . .

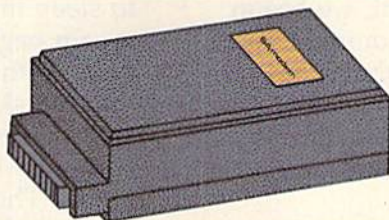


and night ("nuit") in Mimi's world.

Total **Telecommunications™**

4 Products in One Package

Modem



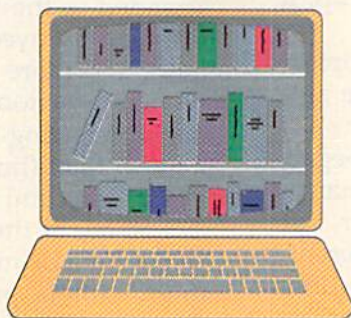
- 300 baud auto dial-auto answer modem

Communications Software



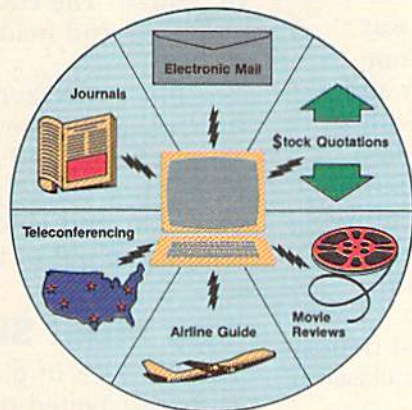
- Advanced telecommunications software
- Sends, receives and stores information
- Easy-to-use
- Automates connections and log-on sequences

Electronic Library



- 8,000,000 books in print
- Full encyclopedia
- Harvard Business Review
- Interactive lectures and seminars
- Microcomputer software directory

THE INFO CENTER™



- Electronic Mail
- Official Airline Guide
- Catalog Shopping
- Movie Reviews
- UPI world news and sports
- Stock quotations
- Journals and magazines in all career arenas
- Teleconferencing
- And much more!

Available at a computer store near you. Or call for more information:

800-22LEARN or **800-44LEARN** in California

For Commodore 64®

Total Telecommunications and The Info Center are trademarks of TeleLearning Systems, Inc.; Commodore 64 is a registered trademark of Commodore Electronics, Ltd.

TOTAL TELECOMMUNICATIONS

TeleLearning Systems, Inc.

505 Beach Street

San Francisco, California 94133

415/928-2800

the path wound around a tree and out of the picture. In the lower righthand part of the stream was a pond fed by the stream.

The picture was simple, but it was well-drawn and had a charming, storybook character. Mimi, too, was appealing. She walked upright and was dressed in overalls and bare feet. Except for her antennas, she resembled a child more than an ant.

Joining Mimi in her world were a worm (le ver), dancing snails (les escargots), a bee (l'abeille), fireflies (les lucioles), and butterflies (les papillons). Since Eric and I couldn't understand the directions in the manual, we began randomly pressing keys on the Commodore. It didn't take us long to figure out that what we were watching was an animated, choreographed picture book accompanied by music. Each time we pressed a key, Mimi or her friends would do something different.

At first Eric and I just experimented by pressing the different keys and watching what happened. Soon, however, we wanted to repeat certain keys, so I opened the manual and discovered a summary of the letter keys and their associated scenes and music.

I had a smattering of French in college, and the descriptions were simple and brief, so I began to understand a little of what was going on. "Push N for nuit," I told Eric. Eric pressed the N key and the sun set, and the moon came up; it became "nuit."

"Press J for jour," I said to Eric. He pressed J and the moon set, and the sun rose. Once again it was "jour."

About that time something magical began happening. Eric and I had traveled into many different microworlds inside the computer, but somehow entering Mimi's world was different. Maybe it was because the "keys" to the world were all in French, and they seemed romantic and mysterious.

Or maybe it was the music, which was unlike anything we had heard on the Commodore 64. It was simple but very fresh and uplifting—something that I associated with a good movie or video animation for children. Along with familiar songs like "Happy Birthday" ("Bonne Fête") and "Frère Jacques," there were many new songs like "Poire, Poire," "Abricot," "Dame Tartine," and "Roi Dagobert," and "Extrait de la Sonate no. 1 de J. S. Bach." Later, I learned that the songs were a mixture of popular French nursery rhymes, folk songs, and classical melodies.

Perhaps the most entrancing part of the program was its seeming ignorance of the heated debate about children's software. Almost all the educational software my children and I had seen

was either game-oriented, drill and practice, or a "tool kit" or "builder kit." But *Mimi* wasn't any of these things. There was no sense of Mimi or her world being mechanically contrived to "motivate" or "educate" a child. Instead, Mimi and her world simply existed. And by being natural (like the characters and scenes in a good movie or picture book), they beckoned Eric and me to believe in them and to enter their world.

Perhaps the most magical scene in the program is when the child presses the R key for *rêve* (dream) after pressing the N key for *nuit* (night). Mimi walks over to her bed, lies down, and goes to sleep in her darkened house. Then Mimi's dream begins and a "dream Mimi" floats out of bed, up through the ceiling of her house, and up into the sky. Mimi lands on the crescent moon and swings while the computer plays "Ah! vous dirais-je Maman" ("Twinkle Twinkle, Little Star"). Then, the dream Mimi goes back into her body, and the dream ends.

Learning French With Mimi

When Eric pressed B, Mimi took a *baignade* (bath) in the pond. When he pressed D, Mimi did a *danse* (dance) on the bridge with the little ver (worm). While the ant and the worm danced, the computer played the familiar French tune, "Sur le pont d'Avignon."

In each case, the letter Eric pressed corresponded to the first letter of a French word. As Eric and I played the game, we began talking more and more in French. I began reading the French directions in the manual out loud, and we began referring to the scenes by their French names: Miel (honey), Violettes (violets), and s'Habille (Mimi gets dressed).

Some of the letters—and scenes—only work in daytime or nighttime, and if Eric tried to do them without pressing the J (*jour*) or N (*nuit*) key first, I would get excited and shout, "No, jour!" or "Nuit!" The crazy thing is that Eric understood me and made Mimi's world turn into day or night.

Eric's two favorite scenes were Mimi's dream (*le rêve*) and when the little worm sneaks into Mimi's house and hides (*se cache*) in Mimi's closet. Eric would press Q to make the worm (*le ver*) hide, and U to make the mischievous little fellow pop out of the closet and surprise Mimi.

The Mimi Storybook

After a week of playing *Mimi* daily, Eric and I finally discovered that by pressing the + and - keys, we could speed up and slow down the scenes. This produced some humorous effects and revived Eric's interest in several of the scenes.

AVAILABLE
SOON!

DriveSaver

with
SpeedLoad™

LOADS SOFTWARE
UP TO 500% FASTER
AND PREVENTS
DAMAGING
DRIVE KNOCK!

INFO/TECHNICAL LINE — (805) 682-4000, ext. 95



1984

COMING OUT
SOON!

ToolKit

with
Hi-Track™

THE ADVANCED
UTILITIES PACKAGE
WITH MULTI-SECTOR
AND 1/2 TRACK
ANALYZERS.

INFO/TECHNICAL LINE — (805) 682-4000, ext. 96



Anne Bergeron, seated between two admirers, and her brother, Eric Bergeron.

A couple days later, Eric was fiddling around with the Commodore 64 keyboard, and he stumbled into a menu with four activities. After experimenting, we found that *Memoire Courte* (Short Memory) would let us create a Mimi "story" by letting us record a sequence of two scenes in the computer's memory. *Memoire Longue* (Long Memory) let us create an ambitious Mimi story with up to ten scenes. When we chose *Retour à Mimi*, the computer returned us to Mimi's world. When we pressed the f7 key, the computer started the story. (We learned we could stop the story by pressing the f5 key.)

To actually create a story we had to choose the *Enregistrement* (Recording) option. Then we reached a second menu. By making choices from this menu, we found we could press several letter keys and compose a new story, or press the cursor keys and the DEL key and edit an existing story. We could attach speeds to each scene in the story by pressing the + (speed up) or - (slow down) key.

A Conversation With *Mimi's* Author

I had the opportunity to have lunch with Anne Bergeron, the author of *Mimi*, while I was in Montreal as a speaker at the second international "Computers in Education" conference sponsored by McGill University. I bumped into Monique Gosselin of Logidisque and she arranged for me to interview Anne over lunch the following day.

Bergeron turned out to be just as fascinating as *Mimi*. She was a mother, a mathematician, and a programmer. She told me that she had

bought a Commodore 64 only two years earlier as a gift to herself for Christmas.

The computer was supposed to be her toy, but as soon as she sat down at it, her 18-month-old daughter Aleck wanted to climb in her lap and bang on the keys. Anne let Aleck bang, and she also began searching for a program that would be appropriate for Aleck to use. After failing to find anything worthwhile, she gave up the search and set out to write a program of her own.

During the day, Anne worked as a mathematician, and her daughter went to day care. At the end of the day, Anne would pick up Aleck and her three-year-old niece Anouk, and they would go home. She worked with Aleck and Anouk at least a half hour every night, asking them what they would like to do on the computer and letting them test different children's programs she was writing.

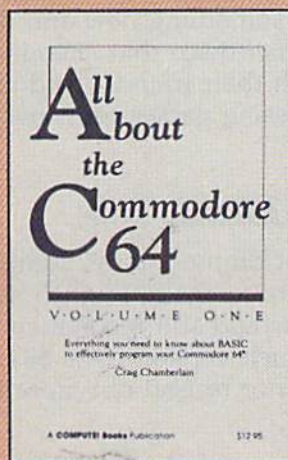
When Anne began writing *Mimi*, she knew nothing about programming, and she didn't know English. She soon gave up on programming manuals, and began reading *COMPUTE!* to learn how to program. Less than a month later, she grew frustrated with how slowly her programs ran in BASIC and she began learning machine language.

Over the next six months, *Mimi* began to take shape. Anne listened carefully to her daughter and her niece's suggestions, and watched them play with *Mimi*. At lunch she told me, "They had lots to say. Sometimes just one question presented me with a whole week of new programming."

The kids' questions and suggestions continued, but after six months Anne was finished—

All About the Commodore 64 from COMPUTE! BOOKS

Special Offer 15% off



All About the Commodore 64: Volume One

Craig Chamberlain

All About the Commodore 64 is written for programmers who want to develop the full potential of their computers. Each chapter introduces a BASIC programming concept and teaches how to use variables, built-in and user-defined functions, logical operators, string variables, subroutines, loops, arrays, and much more. A must for beginning to intermediate programmers.

\$12.95

289 pages

ISBN 0-942386-40-X

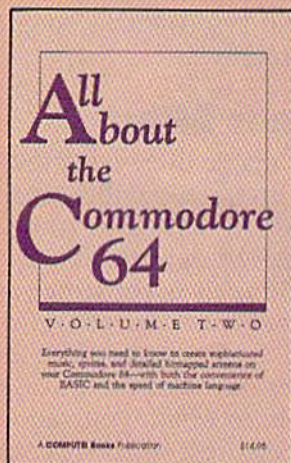
All About the Commodore 64: Volume Two

Craig Chamberlain

Here's something for people who know the BASIC language, but find it too slow or limiting for some applications. The book offers a variety of powerful machine language utility programs that make sound and graphics far more accessible. It is divided into four sections: Advanced BASIC, Bitmapped Graphics, Sound (including a very sophisticated sound editor and player), and a sprite control system.

\$14.95

ISBN 0-942386-45-0



Buy both books and get 15% off! Offer expires April 30, 1985

Send in this coupon with your payment to COMPUTE! Books, P.O. Box 5058, Greensboro, NC 27403, or call toll-free, **1-800-334-0868** to charge your order.

Please place my order for these COMPUTE! titles. All orders must be prepaid.

___ All About the Commodore 64:
Volume One \$12.95

\$ _____

___ All About the Commodore 64:
Volume Two \$14.95

Both volumes: Special price
\$23.70

N.C. Residents add 4.5% sales
tax

Please add \$2.00 shipping
and handling per copy
ordered.

Total payment enclosed

\$ _____

Payment enclosed (check or money order).

Charge my Visa MasterCard

American Express

Acct. No. _____ Exp. Date ____/____/____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Please allow 4-6 weeks for delivery.

754AACG

except for the music. "I knew nothing about music," Anne said. "But my brother Eric did."

Anne enlisted her 16-year-old brother's help, and they tracked down 26 songs that they could match with the 26 letter keys on the computer keyboard. Eric arranged all the songs, and he and Anne programmed them in machine language.

A New Mimi

Last summer *Mimi* competed along with 300 other programs from all over the world and won a special prize at the Avignon International Software Festival. Anne and Eric went over to the SICOB Trade Show in Paris in September and accepted the prize in *Mimi's* honor.

Mimi's success led Anne to start working on *Mimi Two*, which she says may be published very soon. Working with Anne on the new *Mimi* program is Pierre F. Brault, the composer and musician who creates the music for Canada's acclaimed "Passe-Partout" TV program for young children. According to Anne, "Passe-Partout" is Aleck's favorite program. It's the French equivalent of Sesame Street. Pierre is composing all original computer music for *Mimi Two*, and the program will begin with a song entitled "The Mimi Symphony."

The Inner Mimi

Part of the magic of *Mimi* is the program's gentleness and accessibility, even to a very young child. According to Anne, "In *Mimi*, there is no concept of right or wrong answers. Everything a child does is constructive."

Anne says she started out thinking of *Mimi* as a book. "Each scene is like the page in a book," she said. "But then I saw that it was more than a book. In *Mimi*, you can mix up the pages. You can make up your own books."

Anne continued: "Actually, *Mimi* is a little film. When I watched TV with Aleck, she always wanted me to reverse the show, so she could understand it. But she can do that with *Mimi*. She can slow *Mimi* down. And she can play *Mimi* over and over until she understands each scene."

I asked Anne how Aleck and her cousin Anouk used *Mimi*. She said that, despite appearances, *Mimi* was not software for learning letters; that was a side effect.

"*Mimi* is there for discussion," said Anne. "The child needs someone there to talk to and discuss what happens when she presses a certain key."

"Little children can use *Mimi* to learn how to talk, sing, dance, construct a story, and impress friends."

"Impress friends?" I asked.

"Aleck is only three and a half," said Anne, "but she is an expert on *Mimi*. When a big kid (someone 5 or 6) comes over, Aleck is the teacher. She announces a *Mimi* scene before it happens, and she feels important. 'Look at what *Mimi* can do!' she says."

"Will *Mimi Two* be like *Mimi One*?" I asked.

"Now that I am done, *Mimi One* looks easy," Anne says. "*Mimi Two* will be much better. It will be baroque—each time children look at it they will see something new and delightful. There will be a *Mimi* disco that encourages children to dance with their friends. And there will be all sorts of guessing games for *Mimi* and the children to invent."

An English Mimi, Too

Mimi runs on the Commodore 64 computer with a disk drive. It now comes in English as well as French (though I would still recommend the French version). Each version costs \$34.95.

To order *Mimi* or to find out more information, contact:

Logidisque Inc.

C.P. 485 Succ. Place D'Armes

Montreal, Quebec

Canada H2Y 3H3

Phone: (514) 842-5221 or (514) 842-9551

New!

Now You Can Add
**ARTIFICIAL
INTELLIGENCE**
To Your Programs Using a Powerful Combination

**"SUPERFORTH 64"
+AI**

By Elliot Schneider & Jack Park

Here's Your Chance to Profit by being on
the Forefront, Write 5th Generation Software

Learn How To:

- Create Intelligent Programs
- Use Inference Engines
- Write Stand Alone License Free Programs
- Construct Rule Bases
- Do Knowledge Engineering
- Build Expert Systems

Write Intelligent Programs For:

- Home Use
- Robotics
- Medical Diagnosis
- Education
- Intelligent CAI
- Scientific Analysis
- Data Acquisition
- Business
- Real Time Process Control
- Fast Games
- Graphics
- Financial Decisions

Extended Math Functions

- Fast ML Floating Point & Integer Math
- Double Precision 2E+38 with Auto. Sci Not.
- n*e* Logx Loge Sin Cos Tan SQR 1/X
- Matrix and Multidimensional Lattice Math
- Algebraic Expression Evaluator

Easy Graphics & Sound Words

- Hires Plotting
- Windows
- Split Screen
- Printer/Plotter Ctrl
- Sprite & Animation Editor
- Turtle Graphics
- Koala Pad Graphics Integrator
- Hires Circle, Line, Arc
- Music Editor
- Sound Control

Easy Control of all I/O...

- RS232 Functions
- Access all C-64 Peripherals

Utilities

- Interactive Interpreter
- Forth Virtual Memory
- Full Cursor Screen Editor
- Full String Handling
- Trace & Decompiler
- Conditional Macro Assembler
- Interrupt Routines
- Interactive Compiler
- Romable Code Generator
- 40K User Memory
- All Commodore File Types
- Conversational User Defined Commands

Great Documentation

- Easy to Read 350 ps
- Manual with Tutorials
- Source Screen Provided
- Meets all MVP Forth 79 Industrial Standards
- Personal User Support

A Total
Integrated Package



Power of Languages Consults
SuperForth 64 is more powerful than most other computer languages



Programming Time
SuperForth 64 Saves You Time and Money



See us at the
30th West Coast
Computer Fair
Booth #217
Moscone Center
San Francisco
March 30 - April 2

SPECIAL INTRODUCTORY OFFER

only **\$99.00**

203rd Value
Limited Time Offer

(12th Ship U.S.A. • 12th C.O.D. U.S.A. • 115th Overseas)

Commodore 64 TM of Commodore • Parsec Research

See Your Local
Computer Store
or CALL

(415) 651-3160

PARSEC RESEARCH

Box 1766 Fremont, CA 94534

Dealer Inquiries Invited

Number Quest

Gerald and Betty Schueler

Your arithmetic skills may just steer a skydiver to safety in this math game for children. It's also useful for practicing multiplication and division. For the VIC or 64.

In "Number Quest," you're given five chances to guess a number between 10 and 100. For each incorrect guess, you're given a "hint."

This hint can be a number indicating how many times greater or smaller the answer is. For example, if the correct number is 75 and you guess 15, the computer responds 5 TIMES TOO LOW. But if your guess is less than two times greater or smaller than the correct number, the screen displays TOO HIGH or TOO LOW.

You can guess any number from 3 to 100. If you guess correctly within the allotted five turns,

you see a skydiver descend safely to the ground. But if your quest is unsuccessful, the skydiver plunges into a lake.

The hints offered in Number Quest make it a useful program for teaching multiplication and division. By entering 3 for each new number, for instance, you get a drill of the "threes" times table.

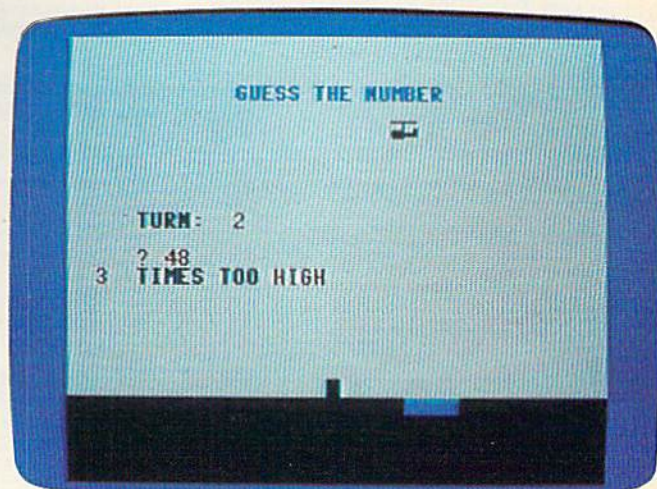
Numbers 1 and 2 are illegal guesses—many children can easily figure out that entering 1, for example, will give them the answer on the next turn. If 1 or 2 is entered, the computer responds with THAT'S TOO EASY!

If you wish to modify the number of guesses (5) in the 64 version, change the 5 in line 250 and the value for TN (6) in line 500. The 6 in this statement indicates that TN (for Turn) has gone over 5. In the VIC version, change the 5 in line 170 and the value for TN in line 380.

See program listings on page 138.



A correct guess allows the parachutist to descend on the landing pad instead of in the drink (VIC version).



The clues in "Number Quest" teach children math concepts (64 version).

A Survival Guide to the 1541 Disk Drive

This is a 40 + page book and comes complete with all commands and examples on how to use them. **\$6.99**

The Complete Book on Telecommunications **\$6.99**

A 40 + page book that will help you get started with your Modem. How to use it and how to access a BBS, CompuServe, Dow Jones as well as up and down load.

1541 Super ROM **\$39.95**

- Fast Save Load Verify
- Fast Scratch and Validate
- 10 Second Format with Verify
- No more Drive Head rattling during Format or Error Reading
- also Save with Replace is Improved
- Two times faster, Eight times faster when used with Turbo 64 which is included
- 1541 Super ROM is 100% Compatible
- Easily installed in Minutes



APALLO COPIES IT ALL

APALLO Does it All. This program is the latest generation of copy programs. It will do everything the \$39.00 and \$49.00 programs will do and **more**. It Copies **ALL** drive errors, bad tracks and sectors, non-standard format, bad syncs, and half tracks. We feel this is the best program of its kind available...



\$29.95

MSD Sure Copy

At last a complete utility package for the MSD Dual Drive. This is the first MSD utility program that does it all. The main menu options include:

- Copy Protected Disk
- Copy Files
- Format a Disk
- Change Disk Name
- Quit
- Copy Unprotected Disk
- Scratch a File
- Rename a File
- View Directory

\$39.95

Sure Copy will put all errors automatically on disk: 20, 21, 23, 27 and 29's.

D-CODER

- Translates any machine language program into easy-to-read English descriptions with complete explanations of each command!
- Makes complete notations of all important memory locations accessed by the program! (SID, VIC, MOS, KERNAL, etc.)
- Gives you three ways of accessing programs:
 - 1) Will read and list programs from DISK
 - 2) Will read and list programs from MEMORY!
 - 3) Direct user input (from magazines, etc.)
- Can be used to locate and examine any machine language program's protection routines!
- Can be used to easily break apart machine language programs for study and examination!
- Printer option for complete hard copy listings!

\$19.95

You no longer need to be an EGGHEAD to read Machine Language.



N-CODER **\$19.95**

the machine language manipulator...

The perfect companion program to D-CODER!

Allows you to easily make changes in machine language programs... right on the disk!

- Rewrite ability allows code to be altered and then rewritten directly to the disk!
- Features sector-by-sector scrolling assembly language display of machine language programs!
- Notation of ASCII text equivalents for easy spotting of embedded text strings!
- Handy reference display of all assembly language commands and their ML numerical equivalents!
- Byte splitter for easy splitting of decimal addresses into low byte-high byte format!



C-64 Label Maker

Choose one to one million labels...

\$14.95

- On-line Instructions
- Allows Fall Editing
- Works with all Standard Printers
- This Program will even put your Disk Directory on Labels for you

Enclose Cashiers Check, Money Order, or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. Canada orders must be in U.S. Dollars. VISA — MASTER CARD — C.O.D.

Programs for C-64 \$2.00 S & H on all orders

Software Submissions Invited.



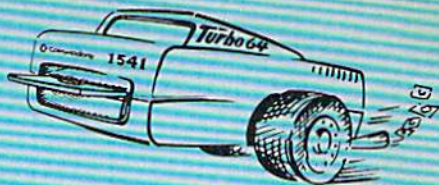
MegaSoft Limited

P.O. Box 1080, Battle Ground, Washington 98604

Phone (206) 687-5116 • BBS 687-5205 After Hours Computer to Computer

TURBO 64

\$19.95



Turbo 64 will turn your 1541 into a super fast and efficient disk drive. Loads programs five to eight times faster, works with 99% of your basic and machine language programs. The master disk allows you to put unlimited Turbo 64 boot copies on all your disks. This disk also includes:

Auto Run Boot Maker

Auto Run Boot Maker will load and auto run your basic or machine language programs.



\$19.95

DMS-Errors 20, 21, 22, 23, 27 & 29
Format Single Tracks
Read-Disk Errors

1/2 Track Reader-read and select 1/2 track.

1/2 Track Formatter-Format a disk with 1/2 tracks. This is where the next protection schemes are coming from.

Drive Mon-Disk Drive assembler/disassembler. For your 1541.

The Doc-Disk Doctor that reads code under errors.

Sync Maker-Place a sync mark on any track out to 41. Also used for protection.

Sync Reader-Check for Sync bits on any track out to 41.

Change Drive No.-Changes drive number (7-30).

Disk Logger-Finds starting track, sector, start and end addresses.

Disk Match-Compare any two diskettes. Byte for Byte.

New Wedge-Easier to use DOS wedge.

ID Check-Check ID's on any track.

Unscratch-Restore a scratched file.

View RAM-Visual display of the free and used sectors on a diskette.

Read/Write Test-1541 performance test.

Repair a track-Repair a track with checksum errors. Reads code under errors and restores track.

Fast Format-Format a disk in just 10 seconds (with verify).

WAR GAMES AUTODIALER



- 1-Auto Dial will automatically dial a set of numbers you choose.
- 2-Review Numbers will review numbers that were answered by a computer.
- 3-Save Numbers will save numbers where a computer answered.
- 4-Hardcopy of Numbers will print out list of numbers where a computer answered.
- 5-LOAD Numbers will load in numbers to continue where it left off.
- 6-Continue will pick up dialing where it was interrupted.

\$29.95

KARTRIDGE KRACKER

NOW you can own this unique and powerful tool which will allow you to dump the contents of 8K and 16K cartridges onto disk! But what's really great is that you can also RUN the cartridges programs without plugging in the cartridge! The KRACKER gets YOU INSIDE the cartridge! Put all your favorites on disk and get rid of the clutter. This package provides you with the software and hardware needed to get started. Program on disk included. (Some cartridges require use of external RAM not included)



\$44.95

SOFTWARE PROTECTION HANDBOOK

3rd Edition

THIRD EDITION! NOW AVAILABLE!

If you're tired of being harassed by protected software and too many copy programs, then this is the book for you! This 224 page manual covers the gambit from legalities to protection methods to step-by-step back up procedures. Now you can learn both how to protect and unprotect software! The techniques covered include copying cartridges to tape or disk, tape protection, and disk protection. Disk protection covers error no.'s 20, 21, 22, 23, 27 and 29 plus single track formatting, header modification, header swapping, half track reading and writing, reading and writing modified bit densities, formatting illegal tracks/sectors, sync writing and more! The Third edition explains, tells how to detect and how to write them with included software. Eleven useful utilities and many protection listings! Our disk analysis programs reveal the protection methods used on your originals. A diskette with all software is available for a minimum extra charge. This may not be the only book you should have for the C-64, but it is certainly the one book you should not be without!

C64 Book only	\$19.95 US
Book & Disk of all programs	\$29.95 US
Vic 20 book Cart. & Tapes only	\$9.95 US

THIS MANUAL DOES NOT CONDONE PIRACY

*SHIPPING: \$2.00

The Original Book of Facts

UNLOCK THE MYSTERIES OF THE COMMODORE

- Simple Instructions
- Easy step-by-step examples
- Tricks you can do your first day
- Introduction to color, sound and much more
- Includes a routine to protect your own programs
- NO MATTER what your experience, the Original Book of Facts is for everyone!

\$6.99

The Advanced Book of Facts

EXPLORING YOUR COMMODORE

- How to use a machine language monitor
- Tips on how to unprotect your software
- Advanced protection for your own programs
- Full size reference charts
- How to design your own menus and more...

\$6.99

BULLETIN BOARD

Set up and operate your own bulletin board with one or two disk drives. This one has all the features and you can customize it easily yourself.

- 1-RUN MEGASOFT BBS
- 2-CREATE MEGA FILES
- 3-ADD TO SYSOP'S CORNER
- 4-NEW SYSOP'S CORNER
- 5-READ MESSAGES
- 6-SCRATCH MESSAGE
- 7-CYCLE MESSAGES
- 8-READ SYSOP MESSAGES
- 9-WRITE OPENING MESSAGE
- 10-READ LOG
- 11-CYCLE LOG
- 12-READ DOWNLOAD FILE
- 13-SCRATCH DOWNLOAD FILE
- 14-ADD TO OTHER SYSTEMS
- 15-CREATE OTHER SYSTEMS

\$59.95

Enclose Cashiers Check, Money Order, or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders. Canada orders must be in U.S. Dollars. VISA — MASTER CARD — C.O.D.

Programs for C-64 \$2.00 S. & H. on all orders.

Software Submissions Invited.



MegaSoft Limited

P.O. Box 1080, Battle Ground, Washington 98604

Phone (206) 687-5116 • BBS 687-5205 After Hours Computer to Computer

Programmer's Notebook

Paul Barnes

If you've discovered a clever timesaving technique or a brief but effective programming shortcut, send it to "Hints & Tips," c/o COMPUTE!'s GAZETTE. If we use it, we'll pay you \$35. Due to the volume of items submitted, we regret that we cannot always reply individually to submissions.

When you're programming, it's helpful to keep reference materials close at hand—books, memory maps, copies of computer magazines, a list of CHR\$ values, the Programmer's Reference Guide, and so on. Ironically, some of the most creative and logical programmers work in the midst of chaos. They may discover a useful POKE and write it down on a scrap of paper. But two days later, the note is buried somewhere in a pile of books, magazines, and other notes. "I know it's here somewhere." Sound familiar?

A three-ring notebook can eliminate some of the mess. Whenever you find a new technique or programming shortcut, write it down in the notebook. You can also jot down ideas for modifications and improvements to programs you've written.

Here are a few techniques I've collected; they'll get you started on your own Programmer's Notebook. With the exception of 64 Emergency Joystick, all the following programs work on both the VIC and 64.

A One-Line GET

When you want the user to choose something from a menu, you wait for them to press a key and then continue. The most common way is to GET a character:

```
100 GET A$: IF A$="" THEN 100
110 IF A$="Y" THEN 500
```

An easier way is to use the WAIT statement. Location 198 keeps track of how many characters are in the keyboard buffer. So replace the two lines above with one:

```
100 WAIT 198,1: GET A$: IF A$="Y" THEN 500
```

What's The SYS?

Have you ever forgotten the starting or ending address of a machine language program? There's a way to figure out where an ML program loads into memory.

If you're working with a Datassette, position the tape so the next program is the one you want to check. Then, in immediate mode, type **OPEN1:CLOSE1**. Opening a program or data file copies the program header into the cassette buffer. And the header contains information about where the program should be loaded. Next, type **PRINTPEEK(829)+256*PEEK(830)** to get the starting address and **PRINTPEEK(831)+256*PEEK(832)** for the ending address.

The first two bytes in a disk program file indicate the starting address. Disk users can enter the following program to read these two numbers:

```
10 OPEN 2,8,2,"PROGRAM NAME"
20 GET #2,A$,B$: Z$=CHR$(0): CLOSE2
30 PRINT ASC(A$+Z$)+256*ASC(B$+Z$)
```

Now you have the starting address. To find the ending address, **LOAD"filename",8,1** and then **PRINTPEEK(45)+256*PEEK(46)**.

Automatic LOAD And RUN

If you don't specify a device number (a disk drive is device 8) when you load or save on a Commodore computer, it defaults to tape.

SHIFT-RUN/STOP automatically loads and runs the next program on tape. Apparently you can't use this feature if you have a disk drive.

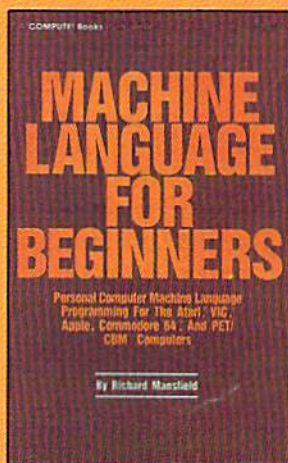
COMPUTE! Books brings you the companion volume to the best seller, *Machine Language for Beginners*, about which the critics have said:

"If you know BASIC and want to learn machine language, this is the place to start . . . Building on your experience as a BASIC programmer, Mansfield very gently takes you through the fundamentals of machine language."—Whole Earth Software Catalog

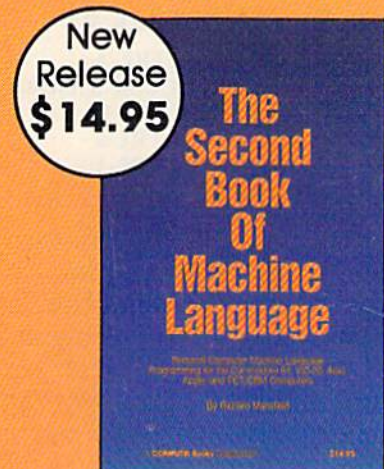
"Understandable"—The New York Times

"Presents the machine language novice with a very good tutorial in simple, understandable terms."—Antic

"I highly recommend Machine Language for Beginners as your first introduction to the world of machine language."—Commodore Power/Play



The Second Book of Machine Language for the Commodore 64, VIC-20, Apple, Atari, and PET/CBM



The Second Book of Machine Language picks up where *Machine Language for Beginners* left off. This new book contains one of the most powerful machine language assemblers currently available. The LADS assembler is a full-featured, label-based programming language which can greatly assist you in writing machine language programs quickly and easily.

It's also a clear, detailed tutorial on how large, complex machine language programs can be constructed out of manageable subprograms.

There are powerful computer languages and there is good documentation, but rarely has a sophisticated language been so completely documented as it is in this book. When you finish with this book, you'll not only have a deeper understanding of machine language—you'll also have one of the most powerful machine language assemblers available. And since everything is thoroughly explained, you can even add custom features to the assembler to create a custom language that does just what you want it to (the book shows you precisely how to modify the assembler).

For Commodore 64, Apple (II, II+, IIe, and IIc, DOS 3.3), VIC-20 (8K RAM expansion required), Atari (including XL, 40K minimum), and PET/CBM (Upgrade and 4.0 BASIC). Disk drive recommended.

THE LADS Disk
LADS, the assembler used in *The Second Book of Machine Language*, is available on disk for only \$12.95. This is a great accompaniment to the book, saving you hours of typing time by providing the complete source and object modules for all versions of the assembler. And LADS disks are specific to your Apple, Atari, or Commodore computers.

15% Discount
Buy both books for **\$25.00** and save **\$4.90!** That's **15%** off the retail price!

Offer Expires March 15, 1985

To Order: Call Toll Free **800-334-0868** (in NC **919-275-9809**) or mail this coupon with your payment to COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403. Offer Expires March 15, 1985

- _____ *The Second Book of Machine Language*, **\$14.95**
- _____ *Machine Language for Beginners*, **\$14.95**
- _____ *LADS Disk (Apple)* **\$12.95**
- _____ *LADS Disk (Atari)* **\$12.95**
- _____ *LADS Disk (Commodore)*, **\$12.95**

- _____ 1 Book for \$14.95
- _____ 2 Books for \$25.00
- _____ *LADS Disk* for \$12.95

- Payment Enclosed (check or money order)
- Charge MasterCard Visa American Express

Acct. No. _____

Signature _____

Name _____

Address _____

City _____

State _____ Zip _____

NC residents add \$ _____
4.5% sales tax

Shipping and handling \$ _____
(\$2.00 per book
\$1.00 per disk)

Total Paid \$ _____

All orders must be prepaid.
Please allow 4-6 weeks for delivery.

COMPUTE! Publications, Inc. One of the ABC Publishing Companies

754MLCG

But you can; try this:



LOAD "filename",8:

Make sure you put the colon just past the 8. And don't press RETURN. While the cursor is blinking to the right of the colon, hold down the SHIFT key and tap RUN/STOP. The word LOAD appears and the program loads from disk. Once it's in memory, it automatically runs.

Also, if you don't like typing long program names, you can load them right from the disk directory. LOAD"\$",8 and then LIST to see the directory. When the program name appears on the screen, press RUN/STOP. Cursor up to the beginning of the line with the program name and type LOAD. Then cursor right just past the second quotation mark and type 8: (again, be sure to include the colon). Press RETURN and the program loads. And you didn't have to type the program name.

Undimensioning Arrays

Arrays can take up a lot of memory. By changing the array pointer, you can clear the array space without affecting other variables. Try this program:

```
10 DIM A(100)
20 POKE 49, PEEK (47): POKE 50, PEEK (48)
30 DIM A(10)
```

Without line 20, line 30 would return a REDIM'D ARRAY ERROR. A couple of POKES is all you need to erase all arrays, freeing up memory (or allowing you to redefine and redimension arrays).

IF-THEN-ELSE

On an IBM PC, you can use lines like 10 IF A=5 THEN PRINT A ELSE PRINT "NOT 5" where ELSE works like an "otherwise." IF-THEN-ELSE is not available on the VIC or 64. Or is it?

Normally, if the condition is not true, the computer drops through to the next line. Using ON-GOTO instead of IF-THEN, you can simulate ELSE and stay on the same line.

```
10 FOR A=1 TO 6
20 ON - (A=5) GOTO 30: PRINT "NOT 5--ELSE
   ":GOTO 40
30 PRINT A
40 NEXT
```

The statement (A=5) is evaluated as 0 if it's false, and as -1 if it's true. If A=5 is true, the program goes to 30. Otherwise, it continues to the statement after the colon, rather than falling through to the next line.

Blinking Cursor For GET

If you prefer GET to INPUT, but want to see the

cursor blinking, here are a couple of POKES that do the job:

```
10 POKE 204,0: WAIT 198,1: GET A$
20 POKE 205,3: WAIT 207,1
30 PRINT A$;: GOTO 10
```

Line 10 turns on the blinking cursor and waits for a keypress. After the user presses a key, line 20 waits until the cursor is off (to avoid reverse characters). The character is then printed to the screen and the program goes back to line 10.

64 Emergency Joystick

You may have left your only joystick at a friend's house. Or perhaps it broke when you were defending the planet from nasty aliens. If you need an emergency substitute for the joystick, try using these keyboard equivalents:

Direction	Joystick #1	Joystick #2
down	back arrow	CTRL-A
up	1	CTRL-(CRSR RIGHT)
left	CTRL	CTRL-D
right	2	CTRL-6
fire	space	CTRL-J

It seems a bit awkward at first, but you do get used to it. This technique works because the keyboard and joystick share some input lines. This is convenient when you need to simulate joystick movement, but it can cause problems. If static electricity sparks against the joystick port when you reach to turn on your 64, you may zap the chip that reads the keyboard. The only way to repair it is to replace the chip.

PRINT@

Two memory locations keep track of the cursor location in X and Y coordinates. The number in 211 is the column number. Location 214 holds the row number. You can PEEK these locations to find out the screen position of the cursor. Or POKE to these locations to simulate the PRINT@ command available in some versions of BASIC.

```
10 PRINT CHR$(147)
20 POKE 214,9: PRINT
30 POKE 211,19: PRINT"LINE 11, COLUMN 20"
```

First the screen is cleared. Next, in line 20, we put the cursor at line 10 (the top line is number zero, so nine is actually the tenth screen line). Every time you POKE 214, you must PRINT a blank line for the message to work correctly. We're now a line further down, on row eleven. Finally, the cursor goes to the twentieth position and a message is printed.

These tips are helpful, but they're not much good if you can't find them when you want to put them to use. A Programmer's Notebook is a handy way to keep track of useful techniques. @

REVIEWS

Dream House

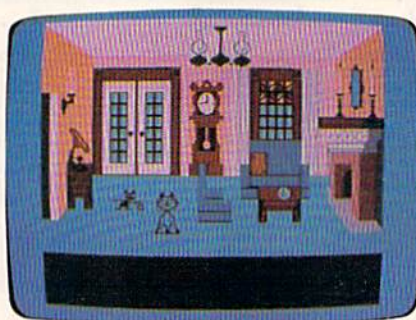
Several years ago, I started a doll house kit. I laboriously laid out all the wood parts and followed instructions to build the doll house. Although I enjoyed working on it, I never completed the project. We've moved several times since then, and each time I've had to carefully hand carry that doll house.

Dream House, developed by Joyce Hakansson Associates for CBS Software, is a less bulky way to build a house—either a doll house or your own “real” house.

You can be an architect, a landscaper, and an interior designer. Four basic styles of houses are included: the Colonial Farmhouse, the San Francisco Victorian, the Manhattan Penthouse, and the Hideaway Cottage. Choose one of these basic houses, or start with one of the houses and customize it. Each of the houses has a floor plan you can view, then you can go into the individual rooms to paint and decorate.

You can choose indoor and outdoor furnishings, landscape the yard, and put furniture inside. You can even use the workshop to build your own furniture. Several of the objects are animated. For example, I put a birdcage in one living room scene, pressed the animation option, and a bird started swinging and chirping.

The introductory music is fun, and the graphics are superb. The strength of this program, however, is its



educational value. Children can learn to read a floor plan and relate that floor plan to the different perspectives of the house. They can have fun with color in designing, and they can manipulate the objects within a design plan.

The manual (“Designer’s Guide”) is well-written and easy to understand. It contains step-by-step examples you can follow before designing your own house. After completion, you can save the interior or exterior (or both) from those screens. Later you can load your design to continue work on it.

Dream House is recommended for ages eight and up. There’s a wide variety of shapes and options available to keep children interested. With computer-aided design, you can be creative without a lot of hassle. The manual suggests several activities for using the program with several people, such as building cooperatively and discussing different approaches or playing hide-and-seek by using different colored paints. This program can provide many hours of fun, enjoyment, and

the feeling of creative accomplishment.

—C. Regena

CBS Software
One Fawcett Place
Greenwich, CT 06836
\$39.95 (disk)

Sargon III

This sequel to the popular *Sargon II* chess program is an even tougher opponent and adds a smorgasbord of features.

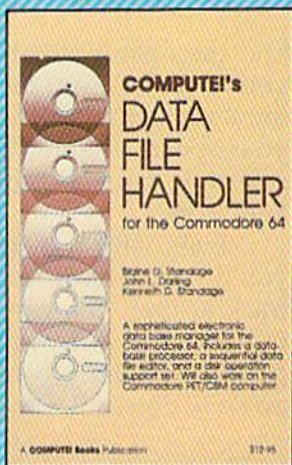
Select from nine levels of difficulty with an average response time ranging from five seconds per move on level 1 to ten minutes per move on level 8. On level 9, the computer keeps thinking until you stop it, at which point it plays the best move it has found. On any level, the computer continues to think while it’s waiting for your move, thus strengthening the computer’s play. This feature can be turned off by selecting Easy Mode, effectively doubling the number of levels.

During the opening, the computer plays “book” moves based on a huge library of over 68,000 positions. An opening library that size is usually found only on mainframe computers.

Additional features make *Sargon III* more friendly than its predecessor. You can take back moves, set up any position, change sides with the computer, review all the moves of the current game from the beginning, save a game to disk, print out the move list or current position, and even ask the computer

COMPUTE! BOOKS

Look for these new titles for your Commodore.



COMPUTE!'s Data File Handler for the Commodore 64

Blaine D. Standage, John L. Darling, Kenneth D. Standage

Data File Handler is a series of integrated programs that give the user a database processor, a sequential data file editor, and a disk operation support set. The book consists of all the necessary program listings and documentation to use this powerful database management system. Few computer programs are as well-explained or as cost-effective as this one. Anyone who wants an effective information management system for their Commodore 64 or PET/CBM will find this an extraordinary software/documentation package.

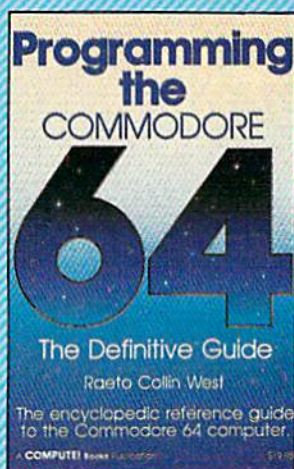
\$12.95
ISBN 0-942386-86-8

Programming the Commodore 64: The Definitive Guide

Raeto Collin West

Programming the Commodore 64 is an encyclopedic, thorough reference guide to the Commodore 64. In the tradition of the renowned *Programming the PET/CBM*, author Raeto Collin West has compiled 17 definitive chapters which cover this computer in its entirety. There are dictionaries, maps, BASIC and machine language examples, and programming aids. Unlike many computer books, which can be read once and discarded, *Programming the 64* will remain valuable for the life of the computer. It starts with BASIC and probes more deeply with each chapter. Ready-to-type programs show how to use the BASIC and Kernal ROMs; the 6502 microprocessor; the CIA, VIC, and SID chips; and the hidden RAM beneath the ROM in the 64. And major peripherals—tape and disk drives, printers, plotters and modems—are also discussed at length.

\$19.95
ISBN 0-942386-50-7



To order, call toll-free **1-800-334-0568** or mail your payment (including \$2.00 per book for shipping and handling charges) to COMPUTE! Books, P.O. Box 5058, Greensboro, NC 27403.

COMPUTE! Publications, Inc. 

One of the ABC Publishing Companies
324 W. Wendover Avenue, Suite 200, Greensboro, NC 27408, 919-275-9809
Publishers of COMPUTE!, COMPUTE!'s Gazette, COMPUTE!'s Gazette Disk, COMPUTE! Books, and COMPUTE!'s Apple Applications

to suggest a move for you. You can also play a friend and let the computer act as referee. The "Window On The Search" lets you see the moves the computer is considering as it thinks.

Sargon III fills both sides of the disk. On the flipside are 107 of the greatest chess games ever played from 1851 to the present. Each of these can be loaded and replayed move by



move. Other positions stored on the disk are used along with the manual to illustrate the opening moves, strategy and tactics, endgame play, and checkmate situations.

The 80-page manual thoroughly explains each feature and includes a summary of the rules of chess.

—John Krause

Hayden Software Company
600 Suffolk Street
Lowell, MA 01854
\$49.95 (disk)

Turbo 64

Many car racing games tend to get old rather quickly. They're exciting at first, but end up on

the shelf in a short time. *Turbo 64* may be a break in that pattern. Limbic Systems calls its program "a thrilling second-generation racing car simulation." Note the word *simulation*. Although it is a game, it's also a well-designed simulation—not for those who expect to make their madcap way through a crowd of howling cars and frequent random explosions.

It's available on disk or tape, and at a most reasonable price. Those who buy the cassette version get a bonus. Through the use of a special system, the game loads in only four minutes. Conventional tape loads of comparably complex programs can take five to ten minutes longer.

Once into the game, there are a number of choices. You must decide between two widely differing racing circuits, choose whether you want automatic or manual shift, set the number of laps and the drivers who will be competing over them (nine is the maximum in both categories), and determine whether you want joystick or—surprisingly—keyboard control.

With the preparations out of the way, you wind up on the track of your choice—alone. It's important to remember that this is a Formula 1 (Grand Prix) simulation. Your highly-tuned car and the twisting, turning track are unforgiving, to say the least. You'll need all the precision and concentration you can muster. At this stage, the display consists of your cockpit instruments, the front of your car,

and the open road ahead. Once you're under way, the instruments return information on your speed, engine RPM, gear selection, lap and timing details, and score.

Even with this information, you'll find it hard to stay on the track at first. You can drive on the margins, but you'll lose points, and the accompanying noise is dreadful. Since the car



has been programmed to behave like a Formula 1 racer, it had better be in the right gear when you go around the turns. But if you crash, the program puts you back on the road at the point where you drove off. Of course your score has been reduced drastically, just as it will be for the serious crime of over-revving your engine. This is a real car. And the object is to take it around the track as quickly as you can, without damage.

The graphics in *Turbo 64* are stunning. The displays are all well-designed and detailed. The 3-D effects are smooth and fluid—with the road snaking away toward the realistic

background. The illusion of reality in *Turbo 64* is reinforced by some excellent sound effects. The changes in engine tone are as impressive as the graphics, and they provide you with important clues about the state of your vehicle. Also, pay close attention to the frequent warning signs on the sides of the road. If you do, they can be lifesavers; if you don't, they're only dangerous barriers. On the more difficult track, you may find yourself driving off the road as you become familiar with the various landmarks. There's a delightful mountain community there. If only you could get off the track and into the hills.

But of course you can't; you're a race car driver, and your focus is the road ahead. In *Turbo 64*, that's a difficult road indeed, and you'll need every advantage. Here, the unusual option of playing from the keyboard offers a great deal of help. You can steer the car with two hands, which seems to give much better control than a joystick. In manual gearshift mode, you use the function keys to select gears—which is almost impossible to do with the joystick controls.

Turbo 64 is an excellent piece of software. As a challenging simulation or as a purely entertaining game, its detailed realism and careful design make this one a winner.

—Lee Noel, Jr.

Limbic Systems, Inc.
560 San Antonio Road, Suite 202
Palo Alto, CA 94306
\$9.95 (tape), \$19.95 (disk)

Nobody copies better !!

Since November 1984, Mr. Nibble has successfully copied heavily protected diskettes for grateful C-64 owners!



While others promise,

MR. NIBBLE™

delivers!

The next generation in archival methods is here today!

- No better disk copier at any price
- Easy-to-use — no complicated instructions
- Totally automatic — no knowledge of DOS required
- You'll LOVE MR. NIBBLE™ — if not, return within 10 days for full refund

Own **THE FINEST DISK COPIER SYSTEM** for
The C-64 and 1541 disk drive - *Order today!*



FULL CIRCLE SOFTWARE, INC.
P.O. Box 1373
Dayton, Ohio 45401
Phone (513) 223-2102

\$49.95 includes shipping & handling
(Ohio residents add 6% sales tax)



10 day return privilege

Special MSD Version now available!

Stealth

First impressions are often misleading, especially when you're looking at commercial game software. After a while, one tends to put things in pigeon-holes. Arcade games, adventure games, strategy games. And subgroupings like shoot-'em-up games, chase games, and maze games come too easily to mind.

Stealth, an arcade game for the Commodore 64 from Brøderbund, suffers from this first-impression syndrome. Glancing at the screen, even playing a few rounds, may give you the idea it's just one more shoot-or-be-shot contest. There are dozens of games already out there like it. At least, that might be what you'd think. Fortunately, it's not true.

Graphically, *Stealth* is outstanding. It has one of the best 3-D views we've seen. You look over the rear and top of a low-flying fighter plane. In the distance are a chain of mountains and the Dark Tower, which looms over the horizon. As you fly toward the Tower, it increases in height. And as you skim the ground, various structures and machines become visible. At first they're only insignificant blurs in the background. But as you get closer, which takes only a moment when you're flying at top speed, they grow larger. Sometimes large enough that they're hard to avoid.

Five levels, the first three of which you can enter when the game begins, test your reflexes

and eyesight. You move to the next higher level once you've destroyed the Dark Tower. You have to get there first. Starting

10,000 meters away, you must fly through a collection of radar stations, energy fields, and on-rushing opponents. And you



New Technological Breakthrough!

ULTRABYTE DISK NIBBLER

The Ultimate Bit by Bit Disk Duplicator
For The Commodore 64 and 1541 Disk Drive

**ULTRABYTE DISK NIBBLER COPIES
ALL SOFTWARE EXCEPT ITSELF**

SATISFACTION GUARANTEED

Return for refund within 10 days
if not completely satisfied

\$ 39.95

Introductory Price

plus \$3.00 Shipping and Handling
MASTERCARD, VISA, CHECK, or M.O.,
Foreign Orders or COD Add \$2.00
Calif. Add 6.5% (\$2.60) Sales Tax

BACKUP COPIES \$20.00 PLUS \$3.00 SHIPPING

Based on new proprietary Disk Operating System (DOS) that reads and writes bits on the disk independent of format. This process, called nibbling, treats disk errors, extra sectors, renumbered tracks and other protection schemes exactly the same as ordinary data.

- Simple to use. Just load and run
- Fast. Copies entire disk on single 1541 in 8 minutes
- One easy step. No separate analysis or error production
- Uses revolutionary Track Scan Technology to make an exact replica of the original disk.

Write or Call 24 Hour Order Line

**ULTRABYTE (818) 796-0576
P.O. Box 789 La Canada, CA 91011**

SOFTWARE AUTHORS PLEASE WRITE



don't have all day to do it. Once your ship's energy is depleted, it implodes. The only way to re-fuel is to fly through the positive (colored yellow) energy fields. Avoiding the red fields, which sap your fighter's fuel, is a major problem. Of course, you can shoot the oncoming scouts, fighters, missiles, bunkers, and tanks, but that too depletes your energy reserves.

So you point your ship's nose at the Dark Tower, push the joystick forward, and hope for the best. Flying at top speed like this is dangerous, for you don't have much time to react, especially when the machines start to come at you one after the other (often hiding behind each other). But at least you have a good chance of reaching the Tower before your fuel is gone. Once you've closed the distance (an indicator keeps track of how far away you are), you have to line up exactly with the structure. One hit is all it takes in the first level; each succeeding level requires an additional hit to bring the Tower down and make the mushroom-like cloud appear.

Stealth is addicting. You're so involved with the action that

it's hard to tear yourself away from the screen. This game may fit in that shoot-'em-up arcade game pigeonhole, but it's one of the best around.

—Gregg Keizer

Brøderbund
17 Paul Drive
San Rafael, CA 94903
\$29.95 (disk)

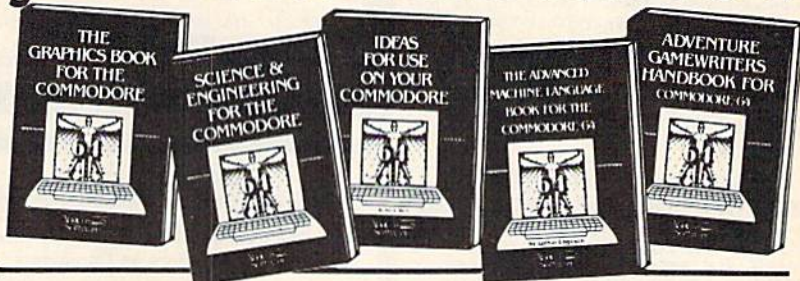
Mind Prober

Imagine a computer program that can analyze your friends,

family, business or school acquaintances—even yourself—telling you things about likes, dislikes, fears, desires, hidden attitudes, and insecurities.

Mind Prober for the Commodore 64 is just such a software program. And despite the oversimplifications which are necessarily a part of this kind of package, the results are fascinating and often startlingly appropriate. Using *Mind Prober*, you can build a personality profile of anyone. The premise, as stated

Required Reading for your COMMODORE 64



TRICKS & TIPS Treasury of programming techniques. Advanced graphics, easy input, enhanced BASIC CP/M, character sets, more. **275 pages \$19.95**

GRAPHICS BOOK Basic to advanced, best reference available. Sprite animation, Hires, Multicolor, lightpen, IRQ, 3D graphics. **350 pages \$19.95**

SCIENCE & ENGINEERING Discuss variable types, computational accuracy, sort algorithms, more. Topics from chemistry, physics, biology, astronomy, electronics. **250 pages \$19.95**

ANATOMY OF C-64 Insider's guide to the '64 internals. Graphics, sound, I/O, kernel, more. Complete commented ROM listings. **300 pages \$19.95**

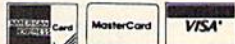
PEEKs & POKEs Programming quickies that will simply amaze you. This guide is packed full of techniques for the BASIC programmer. **180 pages \$14.95**

ANATOMY OF 1541 DISK DRIVE Bestselling handbook on floppy disk. Explains disk files with examples and utilities. Includes complete commented 1541 ROM listings. **320 pages \$19.95**

Other titles available. Phone for name of nearest dealer Phone: (616) 332-4154

Postage & handling \$4.00 (\$8.00 foreign). Money order, checks, VISA, MC, AMEX. Michigan residents (incl. 4% sales tax).

CANADA: Book Center, Montreal (514) 332-4154



You Can Count On
Abacus Software

P.O. Box 7211 Grand Rapids, MI 49510 • Telex 709-101 • Phone 616/241-5510

COMPUTER AND SOFTWARE SALE

COMMODORE 64

(with \$12.95 Bonus Pack Purchase)

\$159⁰⁰*

- 170K Disk Drive \$195.00 *
 - Tractor Friction Printer \$169.00 *
 - 13" Hi-Res Color Monitor \$195.00 *
- *less coupon discount

WE
HAVE
THE
BEST
SERVICE

WE
HAVE
THE
LOWEST
PRICES

SUPER AUTO DIAL MODEM 64

(Best communications package in USA)

\$59⁰⁰

- Computer Learning Pad \$39.95
- New Voice Synthesizer \$59.00
- 12" Green or Amber Monitor \$79.95
- 13" Daisy Wheel Printer \$249.00

SPECIAL SOFTWARE COUPON

We pack a SPECIAL SOFTWARE DISCOUNT COUPON with every COMMODORE 64 COMPUTER DISK DRIVE-PRINTER-MONITOR we sell! This coupon allows you to SAVE OVER \$500 OFF SALE PRICES!!

(Examples) PROFESSIONAL SOFTWARE COMMODORE 64

Name	List	Sale	Coupon
Executive Word Processor	\$99.00	\$39.00	\$29.95
Executive Data Base	\$69.00	\$29.00	\$19.95
20,000 Word Dictionary	\$24.95	\$14.95	\$10.00
Electronic Spread Sheet	\$59.95	\$49.00	\$39.00
Accounting Pack	\$49.00	\$39.00	\$29.00
Practical Programmers Reference Guide	\$59.95	\$34.95	\$29.95
Programmers Reference Guide	\$20.95	\$16.95	\$12.50
Programmers Helper (Disk)	\$59.95	\$39.95	\$29.95
80 Column Screen (Disk)	\$59.95	\$39.95	\$29.95
Disk Filer (by Flip-N-File)	\$39.95	\$14.95	\$12.95
Deluxe Tape Cassette	\$89.00	\$39.00	\$29.95
Pro Joy Stick	\$24.95	\$15.95	\$12.00
Light Pen	\$39.95	\$14.95	\$ 9.95
Dust Cover	\$ 8.95	\$ 6.95	\$ 4.60
Pogo Joe	\$29.95	\$19.95	\$16.95
Pitstop II Epyx	\$39.95	\$24.95	\$19.95
			* Plus One FREE
Music Calc 1	\$59.95	\$39.95	\$34.95
Filewriter	\$59.95	\$39.95	\$34.95

(See over 100 coupon items in our catalog)
Write or call for
Sample SPECIAL SOFTWARE COUPON!

* COMMODORE 64 COMPUTER \$159.00

You pay only \$159.00 when you order the powerful 84K COMMODORE 64 COMPUTER! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your computer that allows you to SAVE OVER \$500 off software sale prices!! With only \$100 of savings applied, your net computer cost is \$59.00!! (See page 13)

* 170K DISK DRIVE \$195.00

You pay only \$195.00 when you order the 170K Disk Drive! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your disk drive that allows you to SAVE OVER \$500 off software sale prices!! With only \$100 of savings applied, your net disk drive cost is \$95.00.

* 80 COLUMN 80 CPS

TRACTION/FRICTION PRINTER \$169.00
You pay only \$169.00 when you order the Comstar T/F deluxe line printer that prints 8 1/2 x 11 full size, single sheet, roll or fan fold paper, labels, etc. Impact dot matrix, bidirectional. LESS the value of the SPECIAL SOFTWARE COUPON we pack with your printer that allows you to SAVE OVER \$500 off software sale prices!! With only \$100 of savings applied your net printer cost is only \$69.00.

* 13" HI-RES COLOR MONITOR \$195.00

You pay only \$195.00 when you order this 13" COLOR MONITOR with sharper and clearer resolution than any other color monitors we have tested! LESS value of the SPECIAL DISCOUNT COUPON we pack with your monitor that allows you to save over \$500 off software sale prices!! With only \$100 of savings applied, your net color monitor cost is only \$95.00. (16 Colors).

80 COLUMN BOARD \$89.00

Now you program 80 COLUMNS on the screen at one time! Converts your Commodore 64 to 80 COLUMNS when you plug in the 80 COLUMN EXPANSION BOARD!! PLUS 4 slot expander! Can use with most existing software.

80 COLUMNS IN COLOR EXECUTIVE WORD PROCESSOR \$39.00

This EXECUTIVE WORD PROCESSOR is the finest available for the COMMODORE 64 computer! The ULTIMATE FOR PROFESSIONAL Word Processing. DISPLAYS 40 or 80 COLUMNS IN COLOR or black and white! Simple to operate, powerful text editing with 250 WORD DICTIONARY, complete cursor and insert/delete key controls line and paragraph insertion, automatic deletion, centering, margin settings and output to all printers! Includes a powerful mail merge.
List \$99.00 SALE \$39.00 Coupon \$29.95

EXECUTIVE QUALITY PROFESSIONAL BUSINESS SOFTWARE

The Cadillac of Business Programs
for Commodore 64 Computers

Item	List	* Sale	Coupon
Inventory Management	\$99.00	\$34.95	\$29.95
Accounts Receivable	\$99.00	\$34.95	\$29.95
Accounts Payable	\$99.00	\$34.95	\$29.95
Payroll	\$99.00	\$34.95	\$29.95
General Ledger	\$99.00	\$34.95	\$29.95

* SUPER AUTO DIAL MODEM \$59.00

Easy to use. Just plug into your Commodore 64 computer and you're ready to transmit and receive messages. Easier to use than dialing your telephone, just push one key on your computer! Includes exclusive easy to use program for up and down loading to printer and disk drives. List \$129.00 SALE \$59.00.

NEW COMPUTER LEARNING PAD \$39.95

Makes other graphics tablets obsolete. This new TECH SKETCH LEARNING PAD allows you to draw on your T.V. or Monitor and then you can print whatever you draw on the screen on your printers. FANTASTIC!!! List \$79.95 SALE \$39.95.

NEW VOICE SYNTHESIZER \$59.00

For Com-64 or VIC-20 computers. Just plug it in and you can program words and sentences, adjust volume and pitch, make talking adventure games, sound action games and customized talkies!! FOR ONLY \$19.95 you can add TEXT TO SPEECH, just type a word and hear your computer talk — ADD SOUND TO "Zork", SCOTT ADAMS AND AARDVARK ADVENTURE GAMES!! (Disk or tape.)

12" GREEN OR AMBER MONITOR \$79.95

Your choice of green or amber screen monitor, top quality, 80 columns x 24 lines, easy to read, anti-glare! PLUS \$9.95 for connecting cable. Com-64 or VIC-20.

13" DAISY WHEEL PRINTER \$249.00

"JUKI" Superb letter quality daisy wheel printer, 13" extra large carriage, up to 12 CPS bi-directional printing, drop in cassette ribbon, centronics parallel or RS232 serial port built in! (Specify)
List \$399.00 SALE \$249.00

COM-64 4 SLOT EXPANSION BOARD \$29.95

Easy to use, switch selectable, reset button and LED indicator — saves your computer and cartridges.
List \$79.00 Sale \$29.95

FLOPPY DISK SALE 98¢

Lowest prices in the U.S.A.!! Single sided single density, with hub rings, quality guaranteed! (100 bulkpack 98¢ ea.) (Box of 10 \$12.00)

PHONE ORDERS

8 a.m. - 8 p.m. Weekdays
9 a.m. - 12 noon Saturdays

- LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
- BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

Add \$10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail!

VISA — MASTER CARD — C.O.D.

PROTECTO ENTERPRISES

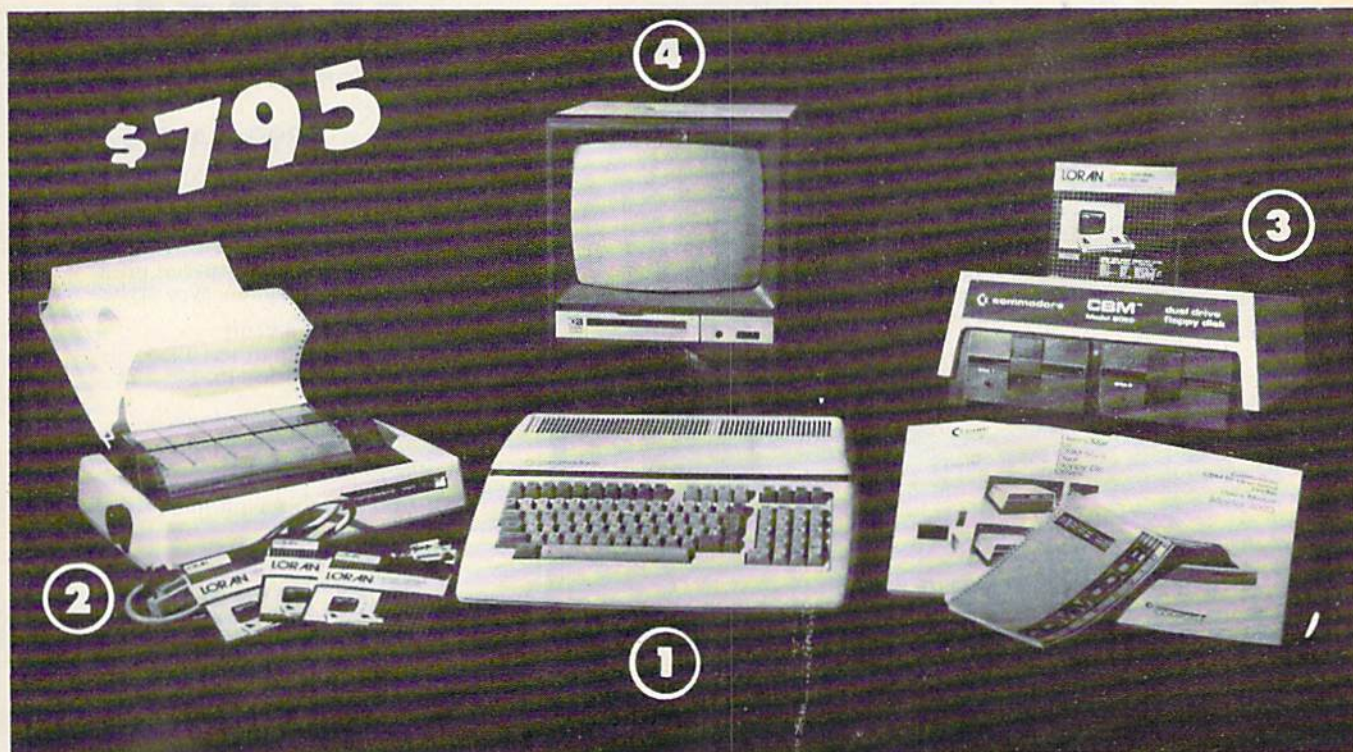
(WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

NEW 128K —MEGA BYTE DUAL DISK DRIVE—80 COLUMN

COMPUTER SYSTEM SALE!

HOME • BUSINESS • WORD PROCESSING



LOOK AT ALL YOU GET FOR ONLY **\$795.**

- | | | |
|--|------------|-----------|
| ① B128 COMMODORE 128K 80 COLUMN COMPUTER | LIST PRICE | \$ 995.00 |
| ② 4023 - 100 CPS - 80 COLUMN BIDIRECTIONAL PRINTER | | 499.00 |
| ③ 8050 DUAL DISK DRIVE (over 1 million bytes) | | 1795.00 |
| ④ 12" HI RESOLUTION 80 COLUMN MONITOR | | 249.00 |
| • BOX OF 10 LORAN LIFETIME GUARANTEED DISKS | | 49.95 |
| • 1100 SHEETS FANFOLD PAPER | | 19.95 |
| • ALL CABLES NEEDED FOR INTERFACING | | 102.05 |

TOTAL LIST PRICE \$3717.95



PLUS YOU CAN ORDER THESE BUSINESS PROGRAMS AT SALE PRICES

Programmers Reference Guide List \$29.95 Sale \$24.95	LIST SALE SYSTEM PRICE*			LIST SALE		* When Bought with B128 Computer System.
	Professional 80 Column Word Processor	\$149.95	\$99.00	\$49.00	\$149.95	
Professional Data Base	\$149.95	\$99.00	\$49.00	\$149.95	\$99.00	
Accounts Receivable	\$149.95	\$99.00		\$149.95	\$99.00	
Accounts Payable	\$149.95	\$99.00		\$149.95	\$99.00	
				Payroll	\$149.95 \$99.00	
				Inventory	\$149.95 \$99.00	
				General Ledger	\$149.95 \$99.00	
				Financial Spread Sheet	\$149.95 \$99.00	
				Order Entry	\$149.95 \$99.00	

☆ **PRINTER REPLACEMENT OPTIONS**
(replace the 4023 with the following printers at these sale prices. Interface Included)

☆ Olympia Executive Letter Quality Printer	\$699.00	\$369.00
☆ Comstar Hi-Speed 160 CPS 15 1/2" Business Printer	\$779.00	\$459.00
Telecommunications Deluxe Modem Package	\$199.00	\$139.00
IEEE to Centronics Parallel Printer Interface	\$179.00	\$139.00

15 DAY FREE TRIAL. We give you 15 days to try out this SUPER SYSTEM PACKAGE!! If it doesn't meet your expectations, just send it back to us prepaid and we will refund your purchase price!!

90 DAY IMMEDIATE REPLACEMENT WARRANTY. If any of the SUPER SYSTEM PACKAGE equipment or programs fail due to faulty workmanship or material we will replace it IMMEDIATELY with no service charge!!

Add \$50.00 for shipping and handling!!

WE DO NOT SHIP THIS SYSTEM TO FOREIGN COUNTRIES, CANADA, PUERTO RICA, ALASKA, OR HAWAII.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! We accept Visa and MasterCard. We ship C.O.D. to continental U.S. addresses only.

PROTECTO ENTERPRISES

(WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

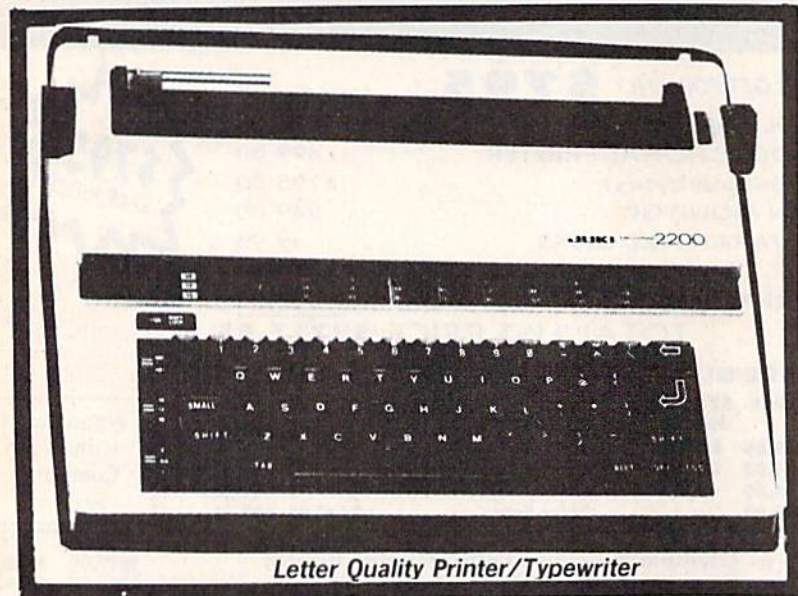
DAISY WHEEL PRINTER SALE!

JUKI®

(Japanese Highest Quality Award Winner)



Letter Quality Printer



Letter Quality Printer/Typewriter

DELUXE LETTER QUALITY "DAISY WHEEL PRINTERS"

JUKI®

DELUXE COMPUTER PRINTER

List Price \$399 **SALE \$249**

- Superb "Daisy Wheel" Computer Printer
- 100 Characters
- Bi-directional with special print enhancements-many type styles- \$18.95
- Pitch 10, 12, 15 CPI
- Print Speed up to 12 CPS
- Print line width: 115, 138, 172 characters
- 13" Extra large carriage
- Drop in cassette ribbon (replacement \$8.95)
- Centronics parallel RS 232 Serial interface built in (specify)

JUKI®

DELUXE "COMBINATION"
PRINTER/TYPEWRITER

List Price \$499 **SALE \$299**

- Superb Computer Business printer combined with world's finest electronic typewriter!
- Two machines in one—just a flick of the switch!
- Superb letter quality correspondence—home, office, word processing!
- 13" Extra large carriage
- Drop in cassette ribbon—replacement \$8.95
- Precision daisy wheel printing—many type styles! \$18.95
- Pitch selector-10, 12, 15 CPS, Automatic relocate key!
- Automatic margin control and setting! Key in buffer!
- Centronics parallel or RS 232 Serial interface built-in (specify)

15 Day Free Trial - 90 Day Immediate Replacement Warranty

• COMMODORE 64 COMPUTER INTERFACE ONLY \$49.00

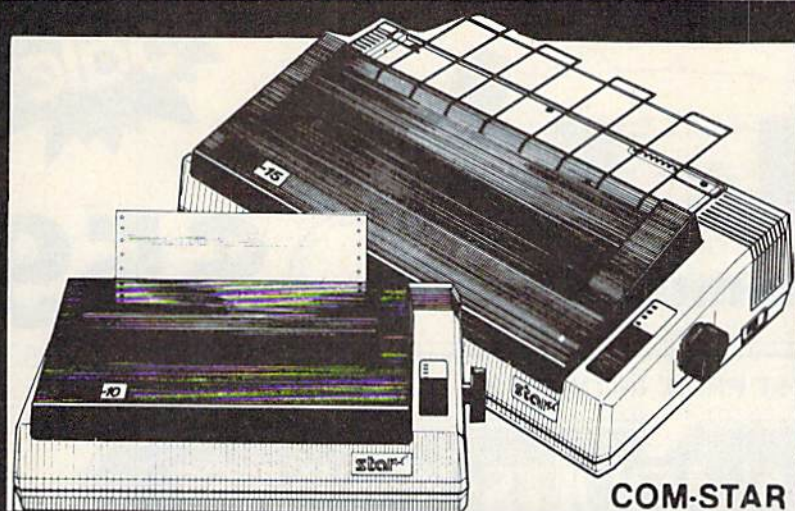
- ATARI INTERFACE \$79.00

ADD \$10.00 for shipping and handling!!

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. VISA — MASTER CARD ACCEPTED. We ship C.O.D.

**PROTECTO
ENTERPRIZES** WE LOVE OUR CUSTOMERS
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

FANTASTIC COMPUTER PRINTER SALE!!!



COM-STAR T/F

Tractor
Friction
Printer

only \$ **169****

- Lowest Priced, Best Quality, Tractor-Friction Printers in the U.S.A.
- Fast 80-120-160 Characters Per Second • 40, 46, 66, 80, 96, 132 Characters Per Line Spacing
- Word Processing • Print Labels, Letters, Graphs and Tables • List Your Programs
- Print Out Data from Modem Services • "The Most Important Accessory for Your Computer"

** DELUXE COMSTAR T/F 80 CPS Printer \$169.00

This COMSTAR T/F (Tractor Friction) PRINTER is exceptionally versatile. It prints 8½" x 11" standard size single sheet stationary or continuous feed computer paper. Bi-directional, impact dot matrix, 80 CPS, 224 characters. (Centronics Parallel Interface).

Premium Quality 120-140 CPS 10X COM-STAR PLUS + Printer \$199.00

The COM-STAR PLUS+ gives you all the features of the COMSTAR T/F PRINTER plus a 10" carriage, 120-140 CPS, 9 x 9 dot matrix with double strike capability for 18 x 18 dot matrix (near letter quality), high resolution bit image (120 x 144 dot matrix), underlining, back spacing, left and right margin settings, true lower decenders with super and subscripts, prints standard, italic, block graphics and special characters. It gives you print quality and features found on printers costing twice as much!! (Centronics Parallel Interface) (Better than Epson FX80). List \$499.00. Sale \$199.00

Premium Quality 120-140 CPS 15½"X COM-STAR PLUS + Business Printer \$319.00

Has all the features of the 10" COM-STAR PLUS+ PRINTER plus 15½" carriage and more powerful electronics components to handle large ledger business forms! (Better than Epson FX 100). List \$599. Sale \$319.00

Superior Quality 15½" COM-STAR PLUS + H.S. High Speed 160-180 CPS Business Printer \$459.00

15½" Carriage and more powerful electronic components to handle larger ledger business forms! (Serial Centronics Parallel Interface). List \$799. Sale \$459.

13" DAISY WHEEL PRINTER \$249.00

"JUKI" Superb letter quality daisy wheel printer, 13" extra large carriage, up to 12CPS bi-directional printing, drop-in cassette ribbon, (90 day warranty) centronics parallel or RS232 serial port built in! (Specify). List \$399.00. Sale \$249.00.

Superior Quality 10" COM-STAR + H.S. HIGH SPEED 160-180 CPS Business Printer \$349.00

This Super High Speed Com-Star+ Business Printer has all the features of the 10" COM-STAR+ PRINTER with HIGH SPEED BUSINESS PRINTING 160-180 CPS, 100% duty cycle, 8K Buffer, diverse character fonts, special symbols and true decenders, vertical and horizontal tabs. A RED HOT BUSINESS PRINTER at an unbelievable low price (Serial or Centronics Parallel Interface). List \$699.00. Sale \$349.00

Printer/Typewriter Combination \$299.00

"JUKI" Superb letter quality, daisy wheel printer/typewriter combination. Two machines in one — just a flick of the switch. 13" extra large carriage, typewriter keyboard, automatic margin control and relocate key drop in cassette ribbon! (90 day warranty) centronics parallel and RS232 serial port built in (Specify). List \$499.00. Sale \$299.00.

• **15 Day Free Trial - 1 Year Immediate Replacement Warranty**

PARALLEL INTERFACES

For VIC-20 and COM-64 — \$49.00. Commodore B-128 — \$139.00. Apple — \$79.00. Atari — \$79.00.

Add \$14.50 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$29.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail! VISA—MASTER CARD—We Ship C.O.D. to U.S. Addresses Only

PROTECTO ENTERPRISES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

COM-STAR PLUS+

Print Example:

**ABCDEFGHIJKLMN OPQRSTUVWXYZ
ABCDEFGHIJKLMN OPQRSTUVWXYZ 1234567890**

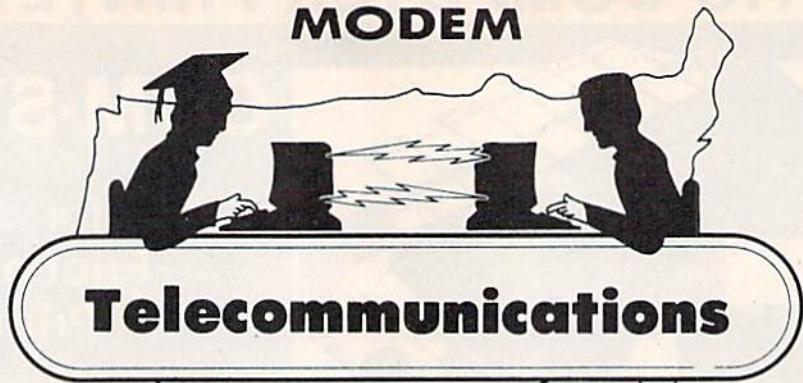


Commodore 64 MODEM



\$59

List \$129.95



\$59

List \$129.95

LOWEST PRICE IN THE USA!

FOR CHILDREN · ADULTS · BUSINESS

Complete Auto Dial Telecommunications Package

"The only telecommunications package you will ever need."

(Exclusive Easy To Use Features)



Total Telecommunications



- 300 Baud Modem • Auto Dial • Auto Answer • Upload & Download
- Membership in 52 Database Services (UPI News, etc.)

Reach Out and Access Someone

- Educational courses
- Financial Information
- Banking at Home
- Popular Games
- News Updates and Information
- Electronic Shopping
- Research and Reference Materials

The Total Telecommunications Package offers you all this plus ...

- Auto Log-on
- Dialing from Keyboard
- On-line Clock
- Capture and Display High Resolution Characters
- Download Text, Program or Data Files
- Stores on Disk Downloaded Files
- Reads Files from Disk and Uploads Text or Program Files
- Select Any Protocol (access almost any computer or modem)
- Plus Much, Much More

List \$129.95

Special Low-Low Price \$59

We are so sure this is the only telecommunications package you will need we will give you 15 days Free Trial.

Add \$3.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$6.00 for CANADA, PUERTO RICO, HAWAII ALASKA. APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail!

VISA — MASTER CARD — C.O.D.

No C.O.D. to Canada, APO-FPO.

PROTECTO ENTERPRIZES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

COLOR MONITOR SALE!!!

(Lowest price in USA)



13" Color Computer Monitor



- Built in speaker and audio
- Front Panel Controls
- For Video Recorders
- For Small Business/Computers
- Apple-Commodore Atari-Franklin-etc.

- Beautiful Color Contrast
- High Resolution
- Separated Video
- Sharp Clear Text
- Anti Glare Screen
- 40 Columns x 24 lines
- Supports 80 Columns
- List \$399
- SALE \$195**

15 Day Free Trial - 90 Day Immediate Replacement Warranty

12" XTRON SUPER HI-RESOLUTION "SWIVEL BASE" MONITOR

List \$249 **SALE \$119***

80 Columns x 24 lines, Super Hi-Resolution 1000 lines
Green or Amber super-clear "Easy to Read" text with special anti-glare screen!

12" **ZENITH** HI-RESOLUTION GREEN OR AMBER TEXT DISPLAY MONITOR

List \$199 **SALE \$99***

80 Columns x 24 lines, Hi-Resolution-crisp clear easy to read text with anti-glare screen! A MUST for word processing.

12" MONITOR GREEN OR AMBER TEXT

80 Columns x 24 lines, easy to read up front controls

List \$159 **SALE \$79.95***

*Plus \$9.95 connecting cable!

• LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
• BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

Add \$10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. Visa - MasterCard - C.O.D.

PROTECTO ENTERPRIZES

(WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

in the packaging, is simply that "it's not who you know, it's how well you know them."

The 64 version of the program is based on whether you agree or disagree with each of 56 adjectives when applied to the person you wish to analyze. Is the individual apologetic, secretive, warm, pessimistic, empathetic? From your responses to these adjectives, *Mind Prober* generates paragraphs of analysis under the headings of Relationships, Attitudes Toward Work, Coping With Stress, and What Makes The Person Tick. If your subject is 18 years of age or older, there is a section on Attitudes Toward Sex. For those under 18, that is changed to a section on Attitudes Toward School.

After running numerous tests of *Mind Prober*, it's apparent that the program is surprisingly sophisticated in the ways in which it analyzes data. At times, the results can be uncanny in their accuracy. On other occasions—especially if you don't know your subject very well—the responses can be a bit ambiguous.

The software comes packaged in the back of a 148-page book, of which almost two-thirds is devoted to an introduction on "reading" other people. There are also more than six pages of reference and bibliographical material at the end of the book for those who wish to pursue the subject more deeply. You can begin using the program without having to go through the manual, however.

Results can be shown on the screen or sent to a printer.

While no one should take a program like this *too* seriously, it's an intriguing, sometimes addicting, approach to the always interesting study of the people around you. It's also great for parties, or for small groups of people. Just be careful who you're with when you begin analyzing.

—Selby Bateman

Human Edge Software Corporation
2445 Faber Place
Palo Alto, CA 94303
\$49.95 (disk)

Financial Cookbook

Electronic Arts has a reputation for supplying good software, and *Financial Cookbook* is no exception. As a smorgasbord of financial programs, this package makes it possible to use an inexpensive Commodore 64 computer and a disk drive to check a wide variety of financial calculations normally handled by more powerful computers. In the context of the program title, *cookbook* means recipes for financial calculations and implies easy use. The name *cookbook* is used all too frequently these days, but in this case it is deserved. There are over 30 recipes ranging from "Understanding Your Marginal Tax Rate" to "Leasing Your Car," each of which is aimed at helping you make sound financial decisions in specialized areas. Other representative topics include "Living on Savings,"

"How Much Life Insurance," "Interest Rate of Loan," "Early Withdrawal IRA," and "Long-Term Investments."

The process of testing a new program always involves a certain amount of fumbling around, trying to make sense of things that may be obvious to the author but not to a new user. With *Financial Cookbook*, however, I didn't waste much time before I was able to try an IRA calculation and check my home mortgage payment.

I picked recipe 14, "An IRA's Future Value," from the menu. The program requested data, such as the amount deposited per year and interest rate. A short time later, the results were printed on the screen. The figures were as expected.

Using recipe 18, "Mortgage Schedule, Yearly," from the menu, I decided to check the figures I receive from the bank on my home loan. The bank's calculation of the monthly payment was correct. However, the program may not be sophisticated enough to calculate the exact amount of remaining principal in a real situation. For example, there exists an escrow fund for taxes, which receives interest. Consequently, the calculated figures for remaining principal were not exact and only in approximate agreement with the bank's.

For the most part, each recipe is easy to use, and output can be directed to a Commodore or Commodore emulating printer. The 32-page manual

includes a technical appendix, which lists all of the formulas used in the calculations. The body of the manual, however, seems a little disorganized. A good short tutorial, which should come first, is included only after three pages of detail that most people won't need or want until much later.

The program is DOS protected, not easily copied, and may not run on disk drives other than the Commodore 1541. Specifically, it did not run on a system using a BusCard II and a 2031 disk drive.

—Harvey B. Herman

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
Suggested retail, \$50 (disk)

Reach For The Stars

Before the advent of computer games, there was a popular and well-designed science fiction board game called *Stellar Conquest*, currently out of print and rarely played. That classic game has now inspired one of the finest computer strategy games available, *Reach for the Stars*.

The game designers have transported the broad scope and strategic interest of *Stellar Conquest* to the computer medium. They've maintained the best parts of the old board game, the planning and economic basis, but they've used the computer to eliminate the tedious areas. *Reach For The Stars* is about the control of star systems. It's sub-

titled "The Conquest of the Galaxy," but conquest is rarely a viable strategy until the game is nearly half completed. Before that point, players are concerned with maintaining their home star system and whatever neighboring systems they manage to get their hands on.

The game allows up to four players. Learning the game well enough to play takes roughly 30 minutes. But, like all good games, mastering it takes a long time. There are several scenarios and levels of play, and each player's turn is divided into several phases such as Movement, Production, Combat, and Planetary Conquest.

You begin each game in control of a primary planet in a star system. Your first act should be to improve the industrial capacity of your home planet, and to produce explorers to look for other systems to colonize. After you're sure your home planet will survive, you head for a nearby star system suitable for colonization. If no other player has already taken this system, you colonize the best planet and build it to self-sufficiency. You continue this pattern until your empire expands into someone else's, at which point your goal changes. Rather than build an empire, you must now defend it.

Somewhere in the distant corner of a galaxy, your main fighting force is locked in battle with the enemy, while a third party has just entered your near-defenseless home star sys-

tem. Meanwhile, your major industrial base has been decimated by a series of earthquakes, and a promising colony is beginning to suffer the problems of overpopulation. You realize, suddenly, that your empire is too big, too easy to attack, too hard to defend. What makes this an excellent game is that you control all these complexities with a few simple keystrokes.

Reach for the Stars has much to offer the strategy gamer. It's straightforward in approach, but filled with surprises. It's complex, but highly manageable. Finally, it feels right.

—Neil Randall

Strategic Studies Group
1747 Orleans Court
Walnut Creek, CA 94598
or
Ground Floor, 336 Pitt St.
Sydney, Australia 2000
\$45 (disk)

Seastalker

As Infocom's first junior level text adventure, *Seastalker* deserves particular attention. Despite the "junior" label, *Seastalker* is not "just for kids." And it doesn't compromise on Infocom's high standards in the slightest way.

What it does is provide initial help for the user and extra coaching along the way, and it does this in a variety of ways.

The game's theme is that of a deep sea adventure, a la *Twenty Thousand Leagues Under*

the Sea. You command a high-tech submarine, the Scimitar, and your ultimate goal is to save the Aquadome, which has come under attack by some type of giant sea monster.

There are numerous subplots to be solved before the final test of skill. To this end, Infocom provides a nautical chart of Frobton Bay, which lies between the research lab and the unknown sea area where the Aquadome resides. They also give you detailed floor plans of your lab and the Aquadome.

Obviously, this provides the gamer with quite an advantage. However, Infocom has been very careful not to reveal too much about these places. *Seastalker* also contains a set of Hidden Clues cards, which are optional in game play. The more experienced (or less frustrated) adventurer may wish to ignore these.

What can't be ignored is the information on the back of each card. Necessary information about the sophisticated equipment found in the lab and aboard the Scimitar is provided on the cards, as is equally important information about each of the crew members.

This also provides a richer flavor for the adventure because personalities are brought into play. Infocom has, for all intents and purposes, created a multi-character adventure that can be controlled by one player.

Other small areas of help are included. For example, on-

screen prompts help you use the correct syntax when inputting commands; the first three moves are given to help you get started. It's easy to see why the game is considered Junior Level when compared to *Deadline* or *Sorcerer*.

Otherwise, *Seastalker* contains all the elements one has come to expect from Infocom: vividly detailed descriptions, intriguing puzzles, and, of course, goodies inside the package (to reveal them would be unfair). The point system employed in other Infocom games is intact, and the adventure can be solved

in any number of ways.

It's important to reemphasize that veteran gamers should not ignore this product. It's an excellent program that will present numerous challenges to the gamer in spite of its billing as a Junior Level adventure. The sea environment, fascinating to explore, and the interaction with other characters give *Seastalker* a different feel from other Infocom games.

—James Trunzo

Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138
\$39.95 (disk)



BACKUP PROTECTED SOFTWARE WITH COPY II 64™

From the team who brought you **COPY II PLUS** (Apple), **COPY II PC** (IBM) and **COPY II MAC** (Macintosh) comes a revolutionary new copy program for the Commodore 64, **COPY II 64!**

- Copies most protected software — *automatically*.
- Copies even protected disks in just 3½ minutes.
- Maximum of four disk swaps on a single drive.
- Copies half and full tracks.
- Not copy protected, of course.

Available at your local dealer or direct from us.

CENTRAL POINT
Software, Inc.

ONLY
\$39.95
(Plus \$3 Shipping & Handling)

9700 S.W. Capitol Highway, #100/Portland, OR 97219

(503) 244-5782   WELCOME

(Prepayment Required)

This product is provided for the purpose of enabling you to make archival backups only.

RABBIT

For the 64 or VIC

~~\$39.95~~ \$29.95



Alternative to the 1541 Disk Drive!

Load or save 8K in 30 seconds! It's less expensive than disk and can even be used as a backup to the flaky 1541!

Yes, the RABBIT is that and much more. Uses the Commodore cassette deck but loads and saves much, much faster than regular Commodore load/save. Think about it — loads or saves an 8K program in almost 30 seconds, 16K in 1 minute, etc. That's nearly as fast as the 1541 disk. RABBIT is on cartridge so it's always there. Also has other useful commands. Specify for use on the 64, or on the VIC 20 —

"It was the best purchase for my computer that I have ever made!"

"Congratulations on your 64 Rabbit. It's a super piece of work!"

MAE NOW THE BEST FOR LESS!

wasted their money on some cheaper off brand assembler tell us how much better the MAE is.

The most powerful Macro Assembler/Editor available for the Commodore 64 and other CBM/PET computers, and also for the ATARI 800/XL and Apple II/IIe.

MAE includes an Assembler, Editor, Word Processor, Relocating Loader, and more all for just ~~\$59.95~~ \$39.95

We could go on and describe the MAE but we thought you would like to read our customers' comments. The following are actual unedited comments from correspondence about the MAE:

"Excellent Development Package."

"Compares to DEC and INTEL."

Please for your own protection consider the MAE first before you buy that other assembler. We've had numerous customers who

"I like MAE and wish that you had it on the Macintosh."

"It is a superb program."

AutoLoad/Directory

Cartridge for the 64.

This cartridge has a push-button switch on it that allows you to: 1) Load and then automatically run the first program on disk, and 2) Display the disk directory — either at the touch of a button! It may not sound like much but it is absolutely one of the most convenient accessories you can install on your 64. Housed in an attractive plastic cartridge complete with easy to install instructions, works with every software package (including menus and commercial software) we have tried and it doesn't take away any memory. Think about it the next time you type: **LOAD "*" ,8,1 RUN** or **LOAD "\$",8 LIST**. Remember, it's only \$19.95.

NEW LOW PRICES

TelStar 64™ by Eastern House

A Communications Cartridge for the Commodore 64.

Upload/Download, Status Line, etc. Works with your Commodore 1600 or 1650 Modem. Auto-dialing, etc. when used with the new CBM 1650 Modem.

Cartridge and Manual — ~~\$48.95~~ \$29.95

Eastern House

3239 Linda Dr.
Winston-Salem, N.C. 27106
(919) 748-8446
Send for free catalog!



CARTRIDGE-MAKER-64™

Create your own COMMODORE-64™ Video game and program cartridges.

Follow the simple and easy screen instructions to:

- Copy your BASIC or ASSEMBLER programs to cartridge
- Copy your cartridge to diskette or cassette
- Copy from cartridge to cartridge
- Erase and reuse cartridges

CARTRIDGE-MAKER-64	\$129.00
CARTRIDGE-ERASER	\$ 59.00
CARTRIDGE-64 (16K)	\$ 25.00
CARTRIDGE-MAKER Kit	\$189.00

Includes: CARTRIDGE-MAKER-64
CARTRIDGE-ERASER and 1 Blank
CARTRIDGE-64 (16K each)

Purchase of 5 Blank CARTRIDGE-64 (16K each)	\$115.00
--	----------

New Products From CPG

ACIA - Serial Port	\$59.95
Program Switchable Mother Board	\$99.00
Add-A-Sound	\$29.95
Calendar Clock	\$79.95

Phone orders (215) 363-8840



Custom Programming Group, Inc.
47-2A Marchwood Road • Exton, PA 19341



Shipping \$3.00,
if C.O.D. add \$2.00
PA residents add 6%
sales tax

Dealer and Distributor Inquiries Invited
CARTRIDGE-MAKER-64 & CARTRIDGE-64
are TM of Custom Programming Group, Inc.
COMMODORE-64 is a registered TM of Commodore
Business Machines, Inc.
CARTRIDGE-MAKER-64 is not intended for piracy of
copyright materials.

VISA-MASTERCARD-C.O.D.-CHECK

How To Type In COMPUTE!'s GAZETTE Programs

Each month, COMPUTE!'s GAZETTE publishes programs for the VIC-20, Commodore 64, Plus 4, and 16. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. Also, carefully read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We publish two programs, which appear periodically, designed to make your typing effort easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then back on, erasing whatever was in memory. So be sure to *save a copy of your program before you run it*. If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the GAZETTE, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 spaces} means to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing another key), the character is underlined>. For example, A means hold

down the the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example; enter eight SHIFTed A's). To type {SHIFT-SPACE}, hold down the SHIFT key and press the space bar.

If a key is enclosed in special brackets, $\{ \} \{ \}$, hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

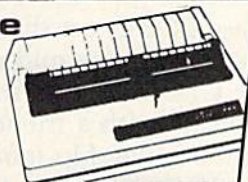
Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT}, and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is the *quote mode*.

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELETE key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:	When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME		{PUR}	CTRL 5		<		
{HOME}	CLR/HOME		{GRN}	CTRL 6		↑	SHIFT	
{UP}	SHIFT		{BLU}	CTRL 7		For Commodore 64 Only		
{DOWN}			{YEL}	CTRL 8				
{LEFT}	SHIFT		{F1}	f1		{E1}	1	
{RIGHT}			{F2}	SHIFT f1		{E2}	2	
{RVS}	CTRL 9		{F3}	f3		{E3}	3	
{OFF}	CTRL 0		{F4}	SHIFT f3		{E4}	4	
{BLK}	CTRL 1		{F5}	f5		{E5}	5	
{WHT}	CTRL 2		{F6}	SHIFT f5		{E6}	6	
{RED}	CTRL 3		{F7}	f7		{E7}	7	
{CYN}	CTRL 4		{F8}	SHIFT f7		{E8}	8	

WE'RE PROUD OF OUR PRICES!

commodore
NEW
1101 LETTER
QUALITY PRINTER
274⁹⁵

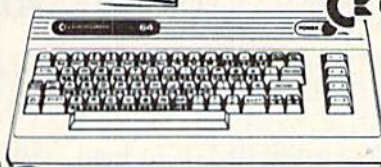


NEW
commodore
128
IN STOCK
279⁹⁵



commodore
1702 MONITOR
174⁹⁵

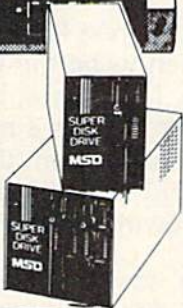
commodore
1541 DISC DRIVE
159⁹⁵



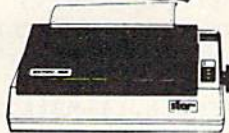
commodore 64
149⁹⁵

ALL CARDCO PRODUCTS
IN STOCK & ON SALE!

NEW! MSD SUPER DISC II
NOW ON SALE
459⁹⁵
Single Drive 249⁰⁰



Modems
Comm 1660⁹⁹
Mighty Mo Call
Telesonic Call
Hes II Call



Printers

Gemini SG 10/15 New! **209⁹⁵**
Gemini SD 10/15 New! Call
Gemini SR 10/15 New! Call
Gemini SB 10 New! . . . Call
Gemini 15X **399⁹⁵**
Silver Reed 400 **249⁹⁵**
Silver Reed 500 **379⁹⁵**
Brother 15X **379⁹⁵**
Brother 25X **514⁹⁵**
Juki 6100 **399⁹⁵**
Blue Chip with
Interface **219⁹⁵**

Diskettes

BASF **13⁹⁵**
Scotch **14⁹⁵**
Maxell **14⁹⁵**
Polaroid **13⁹⁵**

Monitors

BMC Color **169⁹⁵**
Pan 1300 RGB &
Comp. **289⁹⁵**
BMC Green **69⁹⁵**



TOUCH TABLETS

Koala Touch Tablet-D . . . 64.95
Koala Touch Tablet-Cart 69.95
Muppet Learning Keys . . . Call
ACCESS
Neutral Zone-D/T 20.95
Sprintmaster-D/T 20.95
Beachhead D/T 20.95
Master Composer-D 23.95

SPINNAKER

Adventure Creator-Cart 21.95
Aerobics-D 25.95
Aegean Voyage-Cart . . . 21.95
All in the Color Caves-C 21.95
Alphabet Zoo-Cart 20.95
Bubble Burst-Cart 21.95
Cosmic Life-Cart 20.95
Delta Drawing-Cart . . . 21.95
Facemaker-Cart 20.95
Fraction Fever-Cart . . . 20.95
Grandma's House-D . . . 20.95
Jukebox-Cart 20.95
Kids on Keys-Cart 20.95
Kidwriter-D 20.95
Kindercomp-Cart 17.95
Ranch-Cart 20.95
Rhymes/Riddles-D 17.95
Search Amazing
Thing-D 24.95
Snooper #1-D 24.95
Snooper #2-D 24.95
Story Machine-Cart 20.95
Trans-D 24.95
Up For Grabs-Cart 20.95

COMMODORE

Program Ref. Guide 19.95
Assembler-D 17.95
Easy Finance
I,II,III,IV-D 19.95
Easy Calc-D 64.95
Easy Mail-D 17.95
Easy Script-D 39.95
Easy Spell-D 19.95
Logo-D 49.95
The Manager-D 37.95

commodore
Products
801 MCS
Color Printer 269⁹⁵
C-16 Computer **79⁹⁵**
C+4 Computer **189⁹⁵**
801 Printer **149⁹⁵**
802 Printer **179⁹⁵**
803 Printer **174⁹⁵**

General Ledger-D 37.95
Acct. Rec-D 37.95
Accts. Pay-D 37.95
Magic Desk-D 52.95
Zork I, II or III-D 29.95
Suspended-D 29.95
Starcross-D 29.95
Deadline-D 29.95
CBS SOFTWARE
Argos Expedition-D 29.95
Charles Goren's
Bridge-D 49.95
Coco Notes-D 19.95
Ducks Ahoj-D 23.95
Ernie's Magic
Shapes-D 23.95
Mastering the SAT-D 104.95
Movie Musical
Madness-D 24.95
Murder by the Dozen-D 23.95
Peanut Butter Panic-D 24.95
Sea Horse Hide 'n Seek 24.95
Success Decimals
(Add Subt)-D/T 14.95
Success Decimals*
(Mult Div)-D/T 14.95
Success Fractions
(Add Subt)-D/T 14.95
Success Fractions
(Mult Div)-D/T 14.95
Timebound-D 24.95
Webster Word Game-D 24.95
ACCESSORIES
WICO Joysticks Call
Flip 'n' File-D 20.95
Flip 'n' File-Cart 20.95
Joysensor Call
WICO Trakball 37.95
KRAFT Joystick 15.95

18 years of reliable service in:
Plainview, Syosset, New Hyde Park,
West Hempstead, Huntington, Patchogue

TO ORDER CALL TOLL FREE
IN NY STATE CALL TOLL FREE
1-800-221-2760 OR 516-249-2120

1-800-631-1003

Check, Money Order, MC or VISA accepted / No additional charge for MasterCard and Visa / Call for shipping and handling information / NYS residents add applicable sales tax / Prices and availability are subject to change without notice / All factory fresh merchandise with manufacturer's warranty / Prices & policy may vary in retail stores. Dealers Welcome.

Price reductions may have been made since this ad was placed.
Call us for our latest price quotes.

*Call for recent price reductions and new rebate information



**COMPUTER
CENTERS
OF AMERICA**

31 East Mall Plainview NY 11803

Bug-Swatter:

Modifications And Corrections

- The article describing "Kablam!" (January) included two sets of instructions for VIC owners.

Readers who used a tape drive, 8K expansion, and VIC MLX will have problems because Kablam! is saved as an absolute file. To fix the program, insert the 8K (or greater) expander, turn on your VIC, enter the POKE and SYS from the instructions to move memory up (POKE 642,32:SYS 58232), and load MLX. LIST 763 and change the third POKE (POKE782,1) to POKE782,0. Next, run MLX. Use SHIFT-L to load the Kablam! program. Now use SHIFT-S to save back to tape. You don't need to make any corrections other than the change in line 763 of MLX.

- The Commodore 1600 VICmodem, the 1650 Automodem, and the Telelearning and Westridge modems work with the original "C/G Term" terminal program (November 1984). But the Mitey Mo and HESmodem II have a slightly different method of interfacing with the user port.

The following POKES will modify C/G Term to make it compatible with the Mitey Mo and HESmodem II.

1. Enter the POKE and SYS from page 48 of the November issue.
2. LOAD "CGTERM",8,1. After it's loaded, type NEW.
3. Type in the following POKES in immediate mode (without line numbers).

```
POKE 4673,169:POKE 4674,2:POKE 4675,162
POKE 4676,2:POKE 4677,160:POKE 4678,255
POKE 4679,32:POKE 4680,186:POKE 4681,255
POKE 4682,169:POKE 4683,1:POKE 4684,162
POKE 4685,147:POKE 4686,160:POKE 4687,2
POKE 4688,32:POKE 4689,189:POKE 4690,255
POKE 4691,32:POKE 4692,192:POKE 4693,255
POKE 4694,169:POKE 4695,102:POKE 4696,141
POKE 4697,3:POKE 4698,221:POKE 4699,169
POKE 4700,2:POKE 4701,141:POKE 4702,1
POKE 4703,221:POKE 4704,76:POKE 4705,106
POKE 4706,18
```

For the VIC version of C/G Term, make these substitutions in the list:

```
POKE 4697,18:POKE 4698,145
POKE 4702,16:POKE 4703,145
```

4. When you're finished typing, to be sure you've made the correct POKES, check each location by PEEKing its contents to the screen:

```
FOR X=4673 TO 4706:PRINT X;PEEK(X);NEXT
```

5. Load and run MLX, give it the starting and ending address from page 48, and use SHIFT-S to save the modified version.

These POKES set the modem to originate mode, which you should use to communicate with the C/G BBS. When you use C/G Term to communicate with a friend who also has C/G Term and a Mitey Mo modem, one of you will have to set your modem for answer mode. To do this, load the modified version of C/G Term and POKE 4700,64 before you run the program.

- "Address File" (February) contains a bug. When using the Display option to search for specific last names, the program stops searching when it finds a match. If two or more different records contain the same last name, the first record is displayed, but not the others. The following changes will fix the bug:

```
130 GOSUB660:FORI=1TON:IFB$=M$(I,1)+", "+
M$(I,2)THEN150 :rem 65
140 NEXTI:PRINT"{CLR}{DOWN}"B$Q$"{DOWN}IS
NOT IN FILE.":GOSUB620:GOTO40
:rem 151
300 IFM$(A,1)+M$(A,2)<=M$(A+G,1)+M$(A+G,2
)THEN350 :rem 30
410 GOSUB660:FORI=1TON:IFB$=M$(I,1)+", "+
M$(I,2)THEN440 :rem 68
660 PRINT"{CLR}{DOWN}{3 RIGHT}WHAT NAME D
O YOU"Q$"{3 RIGHT}WANT (LAST NAME)":I
NPUT"{2 DOWN}";B$ :rem 14
670 PRINT"{DOWN}{3 RIGHT}ENTER FIRST NAME
":INPUT"{2 DOWN}";C$:B$=B$+", "+C$:RE
TURN :rem 89
```

- If "Turtle Graphics Interpreter" (October 1984) seems to have trouble interpreting commands, check line 5050 of program 1; there must be a space between the two quotation marks.

Tape users may have discovered that while Turtle Graphics Interpreter works, it does not allow you to save defined procedures to tape. Reader Mark Smitka suggests these corrections:

```
23018 POKE 53274,240
23019 OPEN 2,1,0,WD$+" .TURTLE"
23060 CLOSE 2:SYS 49322:RETURN
24018 POKE 53274,240
24019 OPEN 2,1,1,WD$+" .TURTLE"
24040 CLOSE 2:SYS 49322:RETURN
```

After making these changes, when you save or load a procedure, the prompt PRESS PLAY ON TAPE may be unreadable, but this does not affect the program's operation.



THE BANNER MACHINE™ for the Commodore 64

Makes signs up to 10" tall by any length. Borders are variable, up to 3/4" wide. Eight sizes of letters are available from 3/8" to 6 1/2" high. Proportional spacing, automatic centering, right and left justification. Standard, emphasized and compressed modes of print. Save and print banners from disk. Format banner and review before printing. Choice of 15 textured backgrounds. Included FONT DISK

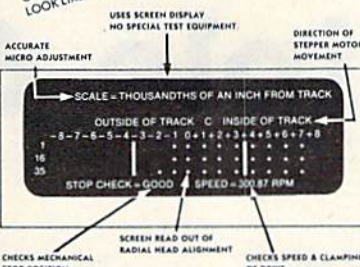


Works only with: Epson MX 80 (with Graftax), RX, FX, JX, LQ; Gemini 10, 10X and 15; Commodore MPS 801, 1525K; Banana; Panasonic P1090; Seikosha GP100A; Rileman II, Plus, 15, Mannesmann Talley, Spirit 80, Okidata 82A, 83A with Okigraph, 92A and 93A, Prowriter 8510, C. Itoh 8510.

THE BANNER MACHINE \$49.95 Available on
FONT DISKS (optional) each \$39.95 DISK only.

1541 PHYSICAL EXAM \$39.95

IS YOUR 1541 HEALTHY?
OR WOULD ITS PHYSICAL EXAM
LOOK LIKE THIS ONE?



Package includes:
• True digital alignment disk with offset tracks
• Quiet Drive stops to reduce need for continued realignment

1541 DISK DRIVE ALIGNMENT PROGRAM

Finally, a complete disk drive alignment program! No special equipment needed! See the review in the October 1984 Gazette.

\$44.95 + 3.50 shipping (U.S.)

PROGRAM PROTECTION MANUAL FOR THE C-64 VOLUME II

This manual begins where the first left off. It will cover the most recent advances in program protection. It will discuss half-tracks, extra tracks and sectors, modified formats, nibble counting, track arcing, unimplemented opcodes and much, much more!!! It is written in that same 'easy to understand' style as the first volume. A disk will be included to help you fully understand all the principals.

\$34.95 + 3.50 shipping (U.S.)

CARTRIDGE BACKER

This package includes an expansion board, user's manual and program disk. Cartridge Backer will backup over 190 of the most popular cartridges to disk. It includes software to backup Electronic Arts™ disks. Software for file copying and disk to tape copying is also included.

\$54.95 + 3.50 shipping (U.S.)

PROGRAM PROTECTION MANUAL FOR THE C-64

Covers the disk drive, bad tracks and sectors, modified directories, cartridges and much more. Covers both basic and machine language protection schemes. A complete memory map and a disk with many helpful programs are included.

\$29.95 + 3.50 shipping (U.S.)

OMNICLONE

A three-minute copy program with full source code listing included. Find out how a professionally written copy program works.

\$35.00 + 3.50 shipping (U.S.)

C S M SOFTWARE, INC.

P.O. Box 563
Crown Point, IN 46307
(219) 663-4335

VISA AND MASTER CARDS ACCEPTED
DEALER INQUIRIES INVITED

ditto
COPY DISKS AUTOMATICALLY
\$39.95

- Copies 99% of currently available Commodore 64 disks.
- Supports 1 of 2 1541 drives.
- Easy to use—menu driven.
- Future updates \$17.

FLEX FILE \$59.95
DATA BASE
with Report Writer and Mail Labels

- Easy to learn (takes about 2 hours) • save up to 1500 typical records on a 1541 disk drive.
- Sort on multiple keys & select records 9 ways.
- Print information on labels or in report format.
- Calculate report columns.
- Flexible structure; change record size, field number, ways the file can be ordered, etc. with ease.
- Compatible with many popular word processors to create form letters or reports. 1541 • 4040 • 2031 Disk \$59.95

ORDER TOLL FREE 104 MON-FRI
800-762-5645
Cardinal Software
13646 Jeff Davis Hwy. 22191
Woodbridge, VA 491-4502

•• WORD GENIE ••
C-64 WORD PROCESSOR

USER FRIENDLY WITH:

- Help screens
- Simple text commands
- Sample letter
- Menu driven

FEATURES:

- Disk Utility
- Printer commands
- Headings & Footnotes
- Double, Triple spacing
- Right justify
- Centering
- Page numbering
- Margin control
- Columns (tabs)
- Word search
- Merge files

IDEAL FOR:

- Personal letters
- Themes & Reports
- Business & Form letters

Priced at only
\$39.95

(Disk only - shipping included)
Send check or money order to:

GENIE SOFTWARE
P.O. BOX 416 DEPT. G.
MALTA, OHIO 43758

Ohio residents please add \$2.20 sales tax.

Uni-Kool
DISK DRIVE FAN
FOR COMMODORE



Designed to work with Commodore Disk Drive Models 1540, 1541, and 1542, the quiet C-100 fan enclosure moves cool, filtered air through the top vents of the disk drive cooling the drive and thereby reducing the misalignment problems caused by heat build-up. A custom filter keeps room dust from entering the disk loading opening. This greatly increases the life span of the disk drives, and decreases the maintenance required to keep the drive functioning properly. Only \$39.95 plus \$2.00 for shipping and 115 vac insurance.

Money Order, Checks or C.O.D. Only

6-month warranty

Uni-Kool (503) 476-1660
909 Williamson Loop, Grants Pass, OR 97526

(Commodore is a registered trademark of Commodore Business Systems)

Triple 64

Feeman Ng

Three computers in your 64? This seven-line program creates three independent 12K blocks which can be accessed very simply. An excellent tool for program development and comparison.

Have you ever wished you could work on two or three programs at once and compare them? Or view a disk directory without erasing a program in memory? This short machine language program lets you do just that.

"Triple 64" is a machine language program (in the form of a BASIC loader) which divides the 64's memory into three independent 12K workspaces. You can work in any of the areas without disturbing the others. You can even save and load from any of the three work areas without affecting the others. The program starts at 40004 (\$9C44) and uses only 71 bytes. Also, a favorite area of many machine language programmers, 49152 (\$C000), is unaffected.

Accessing Three Computers

After entering and saving Triple 64, type RUN. To access any of the three areas, type SYS 40004. Notice that the cursor disappears immediately after you press RETURN. Now, press 1, 2, or 3, the identification numbers of the three independent work areas, and you're ready to begin programming. If you've found that you don't recall which area you're in, type PRINT PEEK(40061). This will return a 1, 2, or 3.

Techniques And Applications

The most obvious use of Triple 64 is to partition the computer to hold three BASIC programs. These could be games, utilities, or applications—or any combination. And switching between them involves only a SYS and a single keypress. Each work area holds up to 12K, space enough for a fairly sophisticated program. (BASIC programs in the GAZETTE are rarely more than 5K.)

Triple 64 may prove even more useful, however, in the development of your own programs. Since the three workspaces are truly separate, this means, for example, one of them could hold a working version of your program, another might contain a test version you're enhancing, and the third section could provide a scratchpad area where you can try out new ideas and write short programs to test them. These testing routines could even examine the other two memory areas for the effects on the programs residing there. When you've got something working well, you can transfer it to another area with this simple procedure:

1. List it to the screen.
2. Select the desired Triple 64 workspace.
3. Cursor up to the lines you want to transfer, and press RETURN over each of them. They'll immediately be inserted into the BASIC program in the new workspace.

Triple 64 offers a wide range of possibilities—it's almost like having three instant 12K disk drives at your disposal. And if you have a disk drive as well, you can maintain its directory in one workspace while you work in the others. This is very useful if your programs will be using files on the disk currently in your drive.

Triple 64

```
10 FORY=40004TO40071:READA:POKEY,A:NEXT
:rem 180
20 FORY=14336TO14338:POKEY,0:NEXT :rem 29
30 FORY=26624TO26626:POKEY,0:NEXT:NEW
:rem 72
40 DATA174,125,156,165,45,157,129,156,165
,46,157,132,156,32,228,255,41,15,240
:rem 19
50 DATA249,201,4,176,245,170,142,125,156,
189,125,156,133,44,189,126,156,133,56
:rem 71
60 DATA189,129,156,133,45,133,47,133,49,1
89,132,156,133,46,133,48,133,50,96,1
:rem 24
70 DATA8,56,104,152,3,3,3,8,56,104
:rem 174
```


WARSI

NOW SHOWING

1541 FLASH!

AT COMMODORE 64™ DEALERS

FLASH! Gets the Gold at the Computer Olympics

The Skyles Electric Works 1541 *FLASH!* dashed off with the gold at the Computer Olympics here.

The 1541 *FLASH!* loaded programs and files *three times faster* than an unenhanced Commodore 1541 disk

**"...faster than
any other disk
drive..."**

drive could. Faster than any other disk drive with compatible disk format.

Three times faster!

The device delighted the home crowd, which watched the 1541 *FLASH!* set a meet record, and leave its competition in the dust.

Once installed, the 1541 *FLASH!* is transparent. Computer operations all remain unaffected as it speeds up every disk-related function. The *FLASH!* is a permanent installation with both a software (ROM) and a hardware component. Through keyboard commands or a hardware switch, you can even return to the old, slow loading method—if you really want to.

And there is nothing new to learn for the *FLASH!* No special tricks or

techniques. Once it's in, just watch it go.

But if you're really serious about programming, the 1541 *FLASH!* is a gold mine. The manual will show you how to write software allowing data transfer to and from the 1541 disk drive at speeds up to *10 times* the normal.

For programs that usually load with a "*,8,1" command, just hit Shift/Run-Stop. A spreadsheet program like *BUSICALC 3* then loads in about 25 seconds.

The 1541 *FLASH!* even adds 21 extra commands for the Commodore 64 user. Some of these include editing, programming and loading commands, as well as "DOS Wedge" commands. You can ignore all these commands, though, and just enjoy the rapid disk operations.

It wowed the crowd at the Computer Olympics. Once you see its sheer speed, you'll know why. Call its coach, Skyles Electric Works, to place your order or to get more info.

**NOW AVAILABLE FOR
THE SX-64™ ... \$99.00***

**NOW AVAILABLE FOR
TWO 1541's ... \$139.95***

1541 *FLASH!*, an add-on assembly for the Commodore 64/1541, costs only \$89.95.*

*There is an additional \$3.50 US and Canada, \$10.00 Europe and Asia, shipping charge per order. California residents add sales tax.



Skyles Electric Works
231E South Whisman Road
Mountain View, CA 94041
(415) 965-1735

**Available from your local
Commodore 64 dealer or
call 1-800-227-9998.**

1541 *FLASH!* is a trademark of Skyles Electric Works.
Commodore 64 and SX-64 are trademarks of
Commodore.

Putting Computer Math To Work For You

The past two columns have been a "beginner's introduction" to computer math. We've seen that your computer has built-in math functions, and we've also seen how numeric variables (X, AB, etc.) are used in BASIC programs. But with all this built-in math power, many beginners still have trouble writing problem-solving programs in BASIC—so that's what we'll cover in the final lesson about math.

These programs will work on your Commodore 64, VIC-20, Plus/4, and 16. Before we get started, let's review computer math symbols.

- + for addition (PRINT 4+4)
- for subtraction (PRINT 9-5)
- * for multiplication (PRINT 2*5)
- / for division (PRINT 10/5)
- / for fractions (PRINT 1/2*1/3)
- ↑ for exponents (PRINT 2↑2)
- . for percent (.12) or decimal (.99)
- () for formulas (PRINT (2/5)*(12.5))—always use same number of left and right parentheses

Math Practice For Parents

A lot of people, especially parents and teachers, like to write math practice programs for children, so let's start with an example to get you started. First, we have to decide a few things. What kind of math do we want to practice? Addition, subtraction, multiplication, division, or a combination of all four? What range of numbers do we want to use in our examples? And do we want to use specific examples or random numbers?

In our example, we'll use addition and use only problems with numbers from 1 to 9. We'll look at a shorter program in a moment, but for now, enter this program and study the tech-

niques being used. And don't forget, you can tailor this program in many ways—for example, print some graphics designs or pictures in different colors, or insert a sound effect when the child gets the answer right.

```

10 Y=1
20 FOR X=1 TO 9
30 PRINT "{CLR}{BLK} THE ADDING GAME": FOR
  R SP=1 TO 5: PRINT: NEXT
40 PRINT "WHAT IS "X"+"Y: INPUT A
50 IF A=(X+Y) GOTO 70
60 PRINT "{CLR}{3 DOWN}WRONG...TRY AGAIN"
  : FOR T=1 TO 700: NEXT: GOTO 30
70 IF A=(X+Y) THEN PRINT " {CLR}{3 DOWN}R
  IGH1": FOR T=1 TO 700: NEXT
80 IF Y=9 THEN GOTO10
90 NEXT
100 Y=Y+1: GOTO20
  
```

Type RUN and press RETURN to use the program. To exit the program after you've got it running, hold down the RUN/STOP key and press RESTORE (RUN/STOP-RESET on the Plus/4 and 16). This program is actually a bit more cumbersome than it has to be, so we can show you some computer math and programming techniques. Let's look at the commands.

Line 10 defines the variable Y as 1. Now the variable Y is the same as the number 1—until we redefine Y in line 100.

Line 20 is the beginning of a very long FOR-NEXT loop. Everything between the FOR in line 20 and the NEXT in line 90 will be repeated 9 times. The FOR-NEXT loop keeps track of each repetition by increasing the value of X on each loop. Because of this, the value of X is 1 the first time the program runs through. The next time the program runs through the loop, the value of X becomes 2, then 3, 4, and so on up to 9. We can use the value of X in other places in our program—our X is defined by the FOR-NEXT loop which is "keeping track" of which loop it's on,

but X still represents a number and we can use it elsewhere.

Line 30 clears the screen and sets the color to black, then displays the opening message. The FOR-NEXT loop in this line is used to print five blank lines (the PRINT command by itself puts a blank line on the screen). This positions the next message farther down the screen.

Line 40 asks our math question. First we print the words WHAT IS inside quotation marks. Then we go outside quotes to print the value of X (which is 1 on the first loop). Then inside quotes to print the plus sign, then back to outside quotes to print the value of the variable Y (which we defined as 1 in line 10). Finally, we ask for an INPUT which automatically displays a question mark on the screen and waits for the child to type in a number and press RETURN. The variable A (for Answer) represents the child's number. From now on, the variable A is the same as the number the child types in.

Line 50 is an IF-THEN statement. IF A = (X+Y) means literally "If A equals the sum of X plus Y." If, in fact, A equals X+Y, then we go to line 70. If not, continue with line 60 where we clear the screen, cursor down three times, and print the WRONG message. The FOR-NEXT loop in this line is a "time delay" loop. You can increase or decrease the delay by changing the number 700. Finally, if there is a wrong answer, the computer goes back to line 30 and repeats the question using the same values of X and Y. The program keeps looping back and will not go on until the child gets the answer right. This is one reason computers are said to be "infinitely patient" teachers.

Line 70 is similar to line 50. If the answer A equals the sum of X+Y, then we clear the screen, print the RIGHT message, pause for a time delay of 700 and automatically move on to line 80.

Line 80 checks to see if Y equals 9, which signals the end of the math sequences. If Y equals 9, the computer goes back to line 10 and resets the value of Y to 1, but line 80 *does not change* the value of Y (that happens in line 100).

Line 90 contains the NEXT command from the FOR-NEXT loop we began in line 20. This command stops the computer here after each loop, sends it back to line 20, and increases the value of X by 1. Remember, Y still equals 1. Thus, in the second loop, the X+Y in our math problem becomes 2+1. In the third loop, X+Y becomes 3+1, and so on. When X equals 9, the computer completes the loop (FORX=1TO9) and, at that point, instead of looping back, *continues on* to line 100.

Line 100 increases the value of Y by 1 and goes back to line 20. Now Y=2 and X=1. We

repeat the FOR-NEXT loop so X+Y in our math problem becomes 1+2, 2+2, 3+2, etc., as X changes from 1 to 9 and Y stays at 2. When X equals 9, the program drops out of the loop to line 100, increases Y to 3, and loops through the math problems (1+3, 2+3, 3+3, etc.). This pattern continues until both X and Y equal 9. At that point, the IF-THEN statement in line 80 takes effect and resets the whole program. If this is still a bit confusing, here's a short program that demonstrates how a FOR-NEXT loop changes the value of the "loop variable" M on each pass through the loop. Watch to see at which point the program leaves the loop and continues on to print the message in line 50:

```
10 PRINT "{CLR}":FOR M=1 TO 5
20 PRINT "LOOP NUMBER" M
30 PRINT "THE VALUE OF M IS" M
40 NEXT
50 PRINT"AT THE END OF THE LOOP THE PROGR
AM CONTINUES..."
```

Random Numbers

You can make the computer generate the values of X and Y completely at random—which is probably a good idea if your child figures out that most of the questions in the previous example can be answered simply by counting in order. Here's what the same program looks like with random numbers:

```
5 X=INT(RND(1)*9)+1
10 Y=INT(RND(1)*9)+1
20 PRINT "{CLR}{BLK} THE ADDING GAME": FO
R SP=1 TO 5: PRINT: NEXT
30 PRINT "WHAT IS"X"+"Y": INPUT A
40 IF A=(X+Y) GOTO 60
50 PRINT"{CLR}{3 DOWN}WRONG...TRY AGAIN":
FOR T=1 TO 700: NEXT: GOTO 20
60 IF A=(X+Y) THEN PRINT"{CLR}{3 DOWN}RIG
HT!": FOR T=1 TO 700: NEXT
70 GOTO 5
```

As you can see, it's actually easier to use random numbers than to try to put everything in order! Lines 5 and 10 use a random number formula (see below) to define X and then Y as a random number from 1 to 9. To get new random numbers for X and Y, all we have to do is go back to lines 5 and 10 and new numbers are automatically selected. The rest of the program is the same as our previous example except that at the end of the program all we have to do is go back to the beginning.

A Quick Review

If you're not sure what a random number is, try this little exercise: Take 10 pieces of paper, write the numbers 1 to 10 on each piece, and put them

in a hat. Now pick up one number without looking. You've just selected a random number from a range of 10 numbers. The lower limit of the range is 1 and the upper limit is 10. Now put the number you drew back in the hat and draw again. Keep drawing as long as you like, but make sure all the numbers are always put back in the hat before you draw. Your hat has now become a "random number generator."

The computer can generate random numbers, too—but much faster. Instead of storing numbers in a hat, the computer stores the numbers in its memory. To use the computer to choose random numbers, you need a random number formula.

In the following formula, we'll define variable R as a random number. To do this, you have to know the lower limit, the upper limit, and the range of numbers you want the computer to choose from:

$$R = \text{INT}(\text{RND}(1) * \text{range}) + \text{lower limit}$$

Let's tell the computer to choose a random number from 6 to 10, including the 6 and the 10. In this example, the *lower limit* is 6, the *upper limit* is 10, and the *range* is 5. To determine the range, subtract the lower limit from the upper limit, and add 1. If the lower limit is 6 and the upper limit is 10, the range is 5 because $(10 - 6) + 1 = 5$. You can also see that if you count 6, 7, 8, 9, 10, you have 5 numbers, so the range of numbers we're choosing from is 5. See how it works? To use the formula, just plug in the lower limit and the range like this:

$$R = \text{INT}(\text{RND}(1) * 5) + 6$$

Now you have to decide what to do with your random numbers—print them, use them in a formula, a game, or what? Let's try something a trifle out of the ordinary. Type NEW and press RETURN, then enter this program:

```
10 G=INT(RND(1)*3)+105
20 PRINT CHR$(G);
30 GOTO 10
```

Type RUN and press RETURN. Your screen begins to fill up with graphics. If you look closely, you'll see that only three symbols are being used—but they are being selected and displayed by the computer in a random pattern.

Line 10 defines G as a random number selected from these three numbers: 105, 106, and 107. Line 20 displays the symbol represented by the CHR\$ code. In this line, we're using the random number to represent a CHR\$ code. Each symbol and command on your keyboard has its own CHR\$ code, sometimes called an ASCII value. (CHR\$ codes are listed in the back of your user's manual.) Printing the CHR\$ code is the same as printing the symbol itself. Here, we've selected three CHR\$ codes (105, 106, and 107)

and we're printing them at random on the screen to make a pattern. The semicolon in line 20 causes the symbols to appear next to each other. Line 30 tells the computer to go back to line 10 and choose another random number before printing the next CHR\$ symbol. Press RUN/STOP to stop the program.

Guessing Game

This program is one of the most classic computer math games. It may even be the first computer game. The object is to guess a number from 1 to 10—but the game isn't nearly as important as the concepts we're going to learn. We'll see how random numbers are used—we'll use the "greater than" (>) and "less than" (<) symbols, the "not equal to" (<>) sign, and, of course, variables. Type NEW and press RETURN, then enter this program and run it:

```
10 R=INT((RND(1)*10)+1):C=0:PRINT CHR$(147);
20 C=C+1:PRINT "{2 DOWN}GUESS NUMBER" C
40 PRINT "{DOWN}GUESS A NUMBER{8 SPACES}FROM 1 TO 10": INPUT N
50 IF N=R THEN PRINT "RIGHT!": FOR T=1 TO 1000: NEXT: GOTO 10
60 IF N<>R THEN PRINT "WRONG...TRY AGAIN": FOR T=1 TO 1000: NEXT: GOTO 20
```

The computer chooses a random number from 1 to 10. You have to guess the number. The computer tells you whether you're right or wrong, then either asks you to choose again or selects another number. The computer also keeps track of how many guesses you've made.

Line 10 defines the variable R as a random number between 1 and 10, sets the value of C (our "guess counter") to zero, and clears the screen (PRINT CHR\$(147) is the same as clearing the screen).

Line 20 uses a simple counter (C=C+1) to keep track of how many guesses have been made, then prints the number of the "guess." Every time there's a wrong answer, the program loops back to this line and increases the value of C by 1, which "counts" the number of guesses.

Line 40 cursors down a line, prints the message, and waits for a number (N) to be typed in.

Line 50 is similar to the RIGHT messages in our math practice example. It checks to see if the INPUT number (N) equals the random number (R), then goes back to get a new random number if the answer is right.

Line 60 contains the WRONG message. If N does not equal (<>) R, it prints the message, waits for a time delay of 1 to 1000, then goes back to line 20 to increase the "C counter" and repeat the guessing message.

A Business Math Lesson

You can use computer math to solve a wide variety of business problems. Here's a quick example to show you how it works. Let's say we're going into business to manufacture a new kind of flower vase. The vases are made out of pottery and are designed with computer symbols. The vases will be sold through computer stores as a novelty item.

It will cost us \$3 to produce each vase, plus about 75 cents for a shipping carton and postage. So our *unit cost* is \$3.75.

Most vases currently sell for \$12.95, but we're going to sell ours for a *retail price* of \$8.

Typically, a computer store gets a 30-40 percent *discount* off the retail price. Our discount will be 40 percent.

The *wholesale price* is the price that we charge the computer stores who buy our vases. In this case, the wholesale price is the retail price (\$8) multiplied by the discount (.40).

Gross margin is the profit we earn before subtracting production and selling costs. This is calculated by subtracting the *cost* from the wholesale price. You can express gross margin either as a dollar figure or a percentage.

The *gross margin percent* is calculated by dividing the gross margin into the cost.

Our challenge is to write a computer program that answers these questions:

1. What wholesale price should we charge our dealers?
2. What is the gross margin in dollars on each vase we sell?
3. What percent of our cost does our gross margin represent?
4. What are the total sales projected in dollars?
5. What is the total gross margin in dollars?

Here's a BASIC program that answers these questions:

```
10 PRINT CHR$(147) "ENTER UNIT COST";:INPUT C
20 PRINT "ENTER RETAIL PRICE": INPUT R
30 PRINT "ENTER DISCOUNT %":INPUT D
35 IF D>1 THEN D=D*.01
40 W=(R-R*D)
45 PRINT "ENTER TOTAL UNITS YOU EXPECT TO SELL DURING PERIOD"
46 INPUT U
50 PRINT CHR$(147) "1. RETAIL PRICE.....
{5 SPACES}$" R
55 PRINT "2. WHOLESAL PRICE..{5 SPACES}$
" W
60 PRINT "3. COST PER UNIT....{5 SPACES}$
" C
65 PRINT "4. GROSS MARGIN.....{5 SPACES}$
" (W-C)
70 PRINT "5. GROSS MARGIN AS A"
```

```
75 PRINT "{3 SPACES}PERCENT OF COST
{7 SPACES}$" (W-C)/C
80 PRINT "6. SALES (UNITS)....{4 SPACES}"
U
85 PRINT "7. SALES (DOLLARS)..{5 SPACES}$
" (U*W)
90 PRINT "8. GROSS MARGIN ON"
95 PRINT "{3 SPACES}TOTAL SALES.....
{5 SPACES}$" (U*(W-C))
105 PRINT "{DOWN}{3 RIGHT}PRESS ANY KEY
{9 SPACES}TO START OVER"
110 GET K$: IF K$="" THEN GOTO 110
115 GOTO 10
```

Line 10 uses PRINT CHR\$(147) to clear the screen, then prints a message and asks for an INPUT. We used the variable C to stand for Cost, which in our example is \$3. From now on the variable C is the same as the cost number that was typed in.

Lines 20 and 30 print messages and ask for additional INPUTs. The retail price is \$8 and the discount should be .40 (.40 is the same as 40 percent.)

Line 35 is helpful to the user. It corrects the answer (input) if the user makes a mistake typing the discount percent. The IF-THEN statement checks to see if D is greater than (>) 1. If the user's answer to the INPUT in line 30 includes the decimal point (.4 or .40), then D is less than 1 and the computer moves on to line 40. If, however, the user typed 40 in response to line 30, the computer sees that 40 is greater than 1 and automatically converts D to the proper form by multiplying D times .01. In other words, if D was 40, the program redefines D as (40*.01) which is .40—the same as 40 percent.

Line 40 calculates the wholesale price by taking 40 percent of the retail price and then subtracting it from the retail price. You could also find the wholesale price by using this formula: $R*(1-D)$, which is the same as .60 times the retail price. From now on we'll use W for Wholesale price. The answer, incidentally, is \$4.80.

Line 45 asks for the estimated number of units you expect to sell. Don't forget that commas are never used in computer math. So if you expect to sell 3,000 units, the INPUT should be typed in as 3000 without the comma.

Line 50 clears the screen and prints the retail price (which you typed in earlier).

Line 55 displays the wholesale price we calculated in line 40.

Line 60 displays the unit cost.

Line 65 calculates and displays the gross margin, which is obtained by subtracting the cost (C) from the wholesale price (W).

Line 70 is the first part of a PRINT message which we want to appear on two lines so it aligns properly on the screen.

Line 75 completes the PRINT message and

calculates the gross margin percent, which is obtained by subtracting cost from wholesale price and dividing it by cost.

Line 80 displays sales in units (actually a sales forecast).

Line 85 calculates and displays sales in dollars, which is obtained by multiplying the total units times the wholesale price. Remember, if you're a manufacturer, your sales are based on the wholesale price you receive from dealers. The computer store dealers' sales are calculated from the retail price, but the manufacturer uses the wholesale price.

Lines 90-95 calculate and display the gross margin on total unit sales, which is obtained by multiplying the total projected units times the gross margin.

Lines 105-115 set up the PRESS ANY KEY option. The PRESS ANY KEY message is printed in line 105. Line 110 is a standard GET K\$ line which is used to scan the keyboard. It makes the computer wait until a key is pressed before going on. Line 115 goes back to line 10, clears the screen, and starts the program over from scratch.

Using Parentheses

You may be wondering why we used the parentheses () the way we did in our business example, so here's a quick explanation. The answer to the following calculation is 7, but how does the computer get the answer?

```
PRINT 3+2*6/3
```

The computer always scans the calculation from *left to right* and first does the *multiplication and division*. Then it goes back and performs *addition and subtraction*. The following chart shows how the computer solves the calculation step-by-step.

What The Computer Does	Result After Each Step
Computer scans calculation.	PRINT 3+2*6/3
Multiply 2*6, which is 12.	PRINT 3+12/3
Divide 12 by 3, which is 4.	PRINT 3+4
Add 3 to 4, which is 7.	PRINT 7

Remember, the computer *multiplies and divides first*, starting from *left to right*—then it *adds and subtracts*. You can control the order of calculation by using parentheses ().

Parentheses tell the computer exactly which parts of the calculation to perform first. Type the following program:

```
10 PRINT 3+2*6/3
20 PRINT (3+2)*(6/3)
30 PRINT (3+(2*6))/3
```

When you run this program, you get three different answers because the parentheses told the computer an order in which to perform the calculations. Here's how:

Line 10 is the example we looked at first.

In line 20, the computer first performs the calculations inside the parentheses by adding 3+2 to get 5—and dividing 6 by 3 to get 2. After this, the formula looks like this to the computer: (5)*(2), so now the computer multiplies 5 times 2 and prints the answer, which is 10.

Line 30 looks complicated, but it really isn't if you understand how the parentheses work. We start by finding the left and right parentheses which are closest together. This is where the computer starts calculating. The parentheses which are *closest together* are (2*6), so first the computer multiplies 2*6 to get 12. Now the calculation looks like this to the computer: (3+(12))/3.

Next we plug the 12 into the formula and work our way out to the next set of parentheses, which looks like this: (3+(12)). The computer adds 3 to 12, which is 15, so now this part of the formula looks like this: ((15))/3—and 15 divided by 3 is 5 so the computer prints the answer, which is 5.

The two right parentheses may look a little strange but we need them because in computer calculations you always need the same number of left and right parentheses. This is essential. If you don't balance parentheses, the computer will give you a SYNTAX ERROR.

Fractions And Computer Math

You can also use parentheses in computer math to convert fractions. For example, the fraction 1/4 is really .25. Here's a quick way to see the decimal equivalents to the fractions from 1/1 to 1/16:

```
FOR F=1 TO 16: PRINT "1/" F " EQUALS" 1/F:
NEXT
```

The computer gives you the answer in decimals, which is another way of expressing fractions. But how do you express a number like 4-1/2? Easy. The number 4-1/2 is the same as adding the number 4 and the fraction 1/2, so if you need to insert a number like 4-1/2 in a computer math formula, you can add the four and the 1/2 inside parentheses, like this:

```
PRINT (4+1/2)
PRINT (4+1/2)*(3+1/3)
```

There are many other ways to use parentheses, particularly in long business or scientific formulas. We'll be exploring some of these techniques as we go along, but for now we'll give "computer math" a rest and spend the next few months exploring other aspects of BASIC programming. Next month, we'll take a look at a group of commands which are seldom discussed in detail—the string (\$) functions.

MACHINE LANGUAGE FOR BEGINNERS

Richard Mansfield, Senior Editor

Customizing BASIC

"Wedge," our example program this month, has several uses. It will show you the number of bytes free in your memory, but unlike typing `?FRE(1)`, it's always on the screen while you program. Thus, you can see the effect of adding a single line, of a `DIM` statement, or any other changes you might make to a program.

While people with an unexpanded VIC are likely to find this constant memory report of the most value, others will also benefit from the way that it reveals how memory is used in a BASIC program. What's more, Wedge illustrates how you can wedge a machine language program into your BASIC language. This is a way that the DOS Wedge and other BASIC expansion utilities can make themselves part of BASIC itself.

(If you don't have an assembler, you can just type in Program 2 and run it like a normal BASIC program. It will build the ML wedge routine for you automatically. Then just `SYS 828` to activate Wedge. And, if you're using a Datasette, be sure to disable Wedge by pressing `RUN/STOP-RESTORE` before tape saves or loads.)

Using Words Instead Of Numbers

Let's go through Program 1 to see how a wedge works. First, you'll see a series of definitions between lines 40-110. Here we tell the assembler the meaning of the various words (called *labels*) that we'll be using in the program. These labels refer to routines or locations within BASIC itself which we will need to access to make our wedge program work.

You can find the addresses of such routines in memory maps for your VIC or 64. Perhaps the most complete and understandable maps are found in *Mapping the 64* and *Mapping the VIC* (COMPUTE! Books). When you need to do something like print a character to the screen, you'll need a map to tell you that address `$FFD2`

(`65490` decimal) will print the character in the Accumulator. This, and hundreds of other sub-routines, are waiting inside your computer. All you need to know is their address (and what information they want from you before you call on them with a `JSR`).

Because of a kink in the way `?FRE(1)` works, because it doesn't really print the actual number of bytes free, we'll avoid using the `?FRE()` routine in ROM. Let's create our own routine which displays the actual number. However, to do this, it's worth looking at the way BASIC calculates bytes free. I used a disassembler to study what BASIC does when you type `?FRE`. Again, I got the address from a map.

How BASIC Stores Programs

It turns out that the computer simply subtracts the address of the arrays from the address of the strings. What's left over is "free" for you to use. To understand what this means, we need to briefly outline how BASIC stores its programs in RAM. First (lowest in available RAM memory) it puts the program itself with the line numbers, commands, and embedded strings (strings like `A$ = "BETTY"`). All this is held together in one mass, and it builds upward as you add new lines to a program.

Above that, there is a storage area for simple numeric variables. Next, any arrays. Then there is a section of free RAM which is the total number of bytes not yet used by either the program proper, the variables, the arrays, or the strings. Finally, *building down from the top of available RAM*, dynamic strings are stored—*dynamic* means they change during a program RUN, like `A$ = A$ + B$`. So the space between the top of the arrays and the bottom of the strings is the free RAM.

Addresses 51,52 in your computer always contain a two-byte number which tells you exactly where the bottom of your string storage is

Program 1: Wedge

```
10 *= 828
11 ;                               "WEDGE"
12 ;
13 .S
14 .O
40 ; ----- DEFINITIONS -----
50 ;
60 STRINGMEMORY = 51;      POINTER TO BOTTOM OF STRINGS
70 ARRAYMEMORY = 49;      POINTER TO TOP OF ARRAYS
80 CHARS = 48589;         CHANGE INTEGER INTO PRINTABLE CHARACTERS
81 ; (USE 56781 FOR VIC CHARS ADDRESS)
90 PLOT = 65520;          SET LOCATION OF CURSOR
100 MAINLOOP = 770;       ADDRESS OF BASIC'S ENTRANCE TO ITS MAIN LOOP
105 PRINT = $FFD2;        PRINT CHARACTER IN THE ACCUMULATOR
110 ;
120 ; ----- RESET POINTER -----
130 ;
140 LDA #<ROUTINE:STA MAINLOOP:LDA #>ROUTINE:STA MAINLOOP+1:RTS
150 ;           THIS POINTS BASIC TO OUR SPECIAL WEDGE.
160 ;
170 ; ----- THE WEDGE -----
180 ;
190 ROUTINE STA A:STY Y:STX X:PHP;   SAVE STATUS OF THE REGISTERS
200 SEC:JSR PLOT;                   FIND CURRENT CURSOR POSITION
210 STX PX:STY PY;                 SAVE CURRENT CURSOR POSITION
220 LDY #0:LDX #30:CLC:JSR PLOT;    SET UP A NEW CURSOR POSITION
230 LDA #58:JSR PRINT;             PRINT A COLON ON SCREEN
240 ;
250 SEC:LDA STRINGMEMORY:SBC ARRAYMEMORY:TAX
260 LDA STRINGMEMORY+1:SBC ARRAYMEMORY+1
270 JSR CHARS;                     CHANGE TO PRINTABLE CHARS.
280 ;                               AND PRINT THEM ON SCREEN
290 ;
300 ; ----- RESTORE CURSOR POSITION AND REGISTERS -----
310 ;
320 LDX PX:LDY PY:CLC:JSR PLOT;     RESTORE CURSOR POSITION
330 PLP:LDX X:LDY Y:LDA A;          RESTORE REGISTERS
340 JMP 42115;                      GO BACK INTO BASIC'S MAIN LOOP
341 ; (USE 50307 FOR VIC TO GO BACK INTO BASIC'S MAIN LOOP)
350 ;
360 ; ----- VARIABLES -----
370 ;
380 A .BYTE 0
390 Y .BYTE 0
400 X .BYTE 0
410 PY .BYTE 0
420 PX .BYTE 0
430 .END WEDGE
```

located. Likewise, addresses 49,50 tell you where the top of your arrays is.

Important Addresses

Another interesting definition can be found in line 80 of Program 1. This routine is normally used by BASIC to print out line numbers. It's a convenient way to transform the computer's ML-style integer number storage format into human-readable decimal numbers on screen. This is handy for printing game scores on screen, etc.

The computer stores most numbers (includ-

ing the addresses of string storage, etc., mentioned above) in a two-byte format. The higher byte (address 52, for string storage) is multiplied by 256 and then added to the lower byte (address 51).

To display such a number on screen at the current cursor position, you would LDX with the lower byte, LDA with the higher byte, and JSR 48589 (56781 for VIC). Play around with this a bit. LDA #0: LDX #45: JSR 48589 will print 45 on screen. What would happen if you LDA #1 in this example? Also, try printing out the string

Program 2: Free 64

```
10 REM 64 WEDGE LOADER
800 FOR ADRES=828TO907:READ DATTA
810 POKE ADRES,DATTA:NEXT ADRES
828 DATA 169, 71, 141, 2, 3, 169
834 DATA 3, 141, 3, 3, 96, 141
840 DATA 140, 3, 140, 141, 3, 142
846 DATA 142, 3, 8, 56, 32, 240
852 DATA 255, 142, 144, 3, 140, 143
858 DATA 3, 160, 0, 162, 30, 24
864 DATA 32, 240, 255, 169, 58, 32
870 DATA 210, 255, 56, 165, 51, 229
876 DATA 49, 170, 165, 52, 229, 50
882 DATA 32, 205, 189, 174, 144, 3
888 DATA 172, 143, 3, 24, 32, 240
894 DATA 255, 40, 174, 142, 3, 172
900 DATA 141, 3, 173, 140, 3, 76
906 DATA 131, 164
```

Program 3: Free VIC (substitute these lines in Program 2)

```
882 DATA 32, 205, 221, 174, 144, 3
906 DATA 131, 196
```

storage address. You do it the same way, but LDX 51:LDA 52 (not using the number sign means Load from the *address* indicated, instead of loading the *actual number itself*). If you don't own an assembler, you can see how this routine works from BASIC. POKE the high byte into 780, the low byte into 781, and SYS 48589 (56781 on a VIC).

We'll define the meaning of PLOT and MAINLOOP when we describe how the Wedge program works. First, however, let's see how to initialize a wedge.

Inserting The Wedge

Sure, BASIC is built into the computer. It's huge. It's entirely ML. It allows you to write programs. But *BASIC is, itself, a program*. Like any other program, it uses data (whatever program *you* type in is the data); it has subroutines (like the CHARS subroutine we discussed above); and it has a main loop. There is a delicate place in BASIC, a soft spot. It spends most of its time just looping through this main loop, waiting for you to type something in. It's here we can attach ourselves to the main loop. We can make BASIC think that our Wedge is one of its normal, required jobs.

One thing that makes our task easier is that BASIC vectors (jumps) through address 770 as part of its main loop. Normally (when you turn on power to the computer) that address will send BASIC right back where it came from in ROM. However, if we change the two-byte number at 770,771 to point to our own ML routine, then

our routine, our wedge, will effectively become part of BASIC's main loop and will be active until power is turned off. We must, however, end our new ML routine with a jump back to the normal BASIC loop in ROM (see line 340).

So, the first thing that happens when we SYS 828 and activate the wedge is that we replace the address of the normal BASIC main loop with the address of our ML routine in that soft spot, addresses 770,771. We've already given 770 the label MAINLOOP (line 100), so in line 140 we can LDA #<ROUTINE:STA MAINLOOP. That puts the low byte of the address of our routine into the low byte of the soft spot. (We labeled the start of our wedge with the name ROUTINE by simply calling it ROUTINE in line 190—that's all you need to do to give some subroutine a name, just type in the name at the start of the subroutine. From then on, you don't need to specify any particular address, just use the name itself.)

Anyway, the special assembler instruction #< will extract the low byte of a number. In this case, we're using the label ROUTINE which is the true start of our wedge. Whatever its low byte is will be put into address 770. Then, we do the same thing for the high byte with the #> command and put it into MAINLOOP+1 (which is address 771). You can see that we don't need to bother knowing where in memory ROUTINE will be. We can extract and store its address using the #< and #> pseudo-ops. (A *pseudo-op* is an instruction which tells an assembler how to do something. It's not one of the 6502 computer-understandable commands. It doesn't become part of the final ML program. It just assists you by communicating some special information to your assembler.)

Now that we've linked ourselves into BASIC's main loop by stuffing our ROUTINE address into that special MAINLOOP vector, whatever follows will be continually executed by the computer.

Keeping BASIC Sane

We don't want to muck things up for BASIC, though. So our first responsibility is to save the current values held in the Accumulator, the X and Y registers, and the Status Flag. All this is accomplished in line 190. For example, we save the Accumulator value in a variable we've named "A" (see line 380). You could call it whatever you wanted: SAVEACC might be your name for the place where the Accumulator is stored during the active life of the wedge. If you chose that name, line 380 would simply read:

```
380 SAVEACC .BYTE 0
```

and line 190 would say STA SAVEACC.

The assembler doesn't care what names you give things, just so you're consistent. The .BYTE pseudo-op simply reserves space in memory for you to store things. For every number following .BYTE, one byte will be set aside. If you wanted to reserve five bytes for some kind of storage, you would type:

```
STOREFIVE .BYTE 0 0 0 0 0
```

or if you wanted to store particular numbers there ahead of time you could type:

```
FIRSTFIVE .BYTE 0 1 2 3 4
```

Whatever. It's pretty much up to you. You can use these storage places the way you'd use variables in BASIC. You can put things in and get them out by just giving the location label, as in LDA FIRSTFIVE (getting you the 0) or LDA FIRSTFIVE+3 (loading in the 3).

You can store alphabetic characters, too:

```
NAME .BYTE "STEVE (just use the quotes to show that it's alphabetic)
```

Manipulating Cursor Position

But back to the wedge. After we save the registers, we JSR (Jump to SubRoutine) to the PLOT subroutine within BASIC. PLOT is a valuable routine. If you first set the carry flag (in the Status Register, by invoking the SEC command as we're doing here), the PLOT routine does something useful. When the computer returns from JSR, you'll find the X Register holding the current line number and the Y Register the current column where the cursor is. Again, we're going to save the current cursor position (using SEC:JSR PLOT:STX PX:STY PY). PX and PY are BYTE defined variable storage locations (like the A, X, and Y storage).

Next, however, we can make PLOT perform the reverse function by simply using CLC (Clear the Carry flag) instead of SEC. Now (line 220), we've loaded the Y Register with the line number and the X Register with the column number. This JSR to PLOT installs this as the new current position of the cursor on screen. That's where we'll want to position our bytes free report.


We then print a colon to the screen to prevent accidental RETURNS over the bytes free number (thereby possibly affecting the BASIC program).

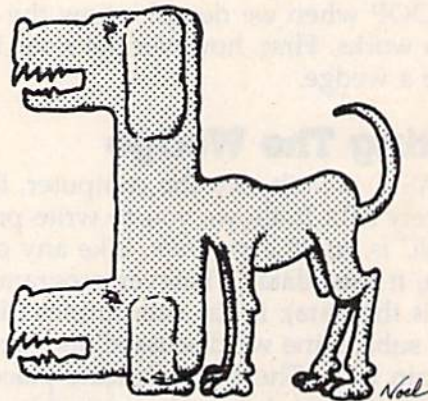
Now (lines 250-260) we subtract the top-of-arrays memory location from the bottom-of-strings and leave the low byte of the result in the X Register and the high byte of the result in the Accumulator. The high byte is already in the Accumulator following the second subtraction (SBC) command.

Tidying Things Up

JSR CHARS prints the number of bytes free on the screen and we're pretty much finished with our wedge. All that's left is a bit of housecleaning: restoring the saved registers and the cursor position to their status before we entered our wedge. So, we LDX from the PX variable, LDY and make PLOT restore the line and column of the cursor. Then, we pull the processor status byte (the flags) off the stack with PLP, restore the values of A, X, and Y, which have been held for us in the variable spaces we created and unimaginatively called A, X, and Y, and then jump into the normal BASIC main loop address.

It's instructive to activate Wedge and then type in BASIC lines and see their impact on memory usage. For one thing, try DIMming different kinds of arrays (integer, floating point, or string) to see how much space each kind reserves for itself. You'll have to run the program to force the DIM into action—just typing in a new BASIC line with DIM in it won't allocate space.

Also try building a sample array from DATA statements. Try CLR, NEW, etc. What would happen if you defined a variable in immediate mode? (A\$ + "NEW WORD")? If you want a challenge, see if you can modify Wedge to work while a BASIC program is running, so you can SYS 828 from within the program itself. 



LOW BYTE / HIGH BYTE FORMAT

COMPUTE!'s Gazette

TOLL FREE

Subscription Order Line

800-334-0868

In NC 919-275-9808

Charles Brannon
Program Editor

This month, let's take a detailed look at a small game program written in BASIC. We frequently get questions about how to write computer game software, questions like: "How do you move an object around the screen with a joystick?" "How do you tell when one object has hit another?" "How do you get the computer to keep score?"

It's worth remembering that, inside a computer, there are no "objects," just strings of numbers moving around in memory. And it can help a programmer to think of a game as a series of actions, but these actions are expressed in great detail. You cannot just type in MOVE PLAYER1 WITH JOYSTICK. Even a prewritten subroutine cannot be flexible enough to adapt to all possible variations of moving a player with a joystick. You have to read the joystick, interpret the direction, then use statements to move the object (a character or a sprite, say) in the desired direction. While you move the object, you have to move any other objects, check for collisions between objects, update the score, decrease game time remaining, update sound effects, etc. You have to give all the details.

"Pudding Mountain Miner"

This 17-line program is a complete, though tiny game. I originally wrote this program to run with a COMPUTE! subscription promotion in several major newspapers when the GAZETTE first started up. Readers of the ad could enter the small program and get a taste of typing in their own programs. The game is pretty much fun to play, considering its size. Pudding Mountain Miner runs on either the VIC or 64, thanks to some programming that checks to see which machine it's running on. It's tightly packed, written to use as little space as possible. This can make a program hard to read, since long variable names, single statement lines, and REMarks all take their share of space and memory.

```

100 V=(PEEK(0)=76):W=40+18*V:T=1024-6656*
    V:C=55296+16896*V:S=53281+16402*V
    :rem 20
110 C$=CHR$(147):PRINTC$:POKES,1-26*V:FOR
    I=0TOW-1:Q=22*W+I
    :rem 208
115 POKET+Q,160:POKEC+Q,7:NEXT
    :rem 93
120 S$=CHR$(32)+CHR$(158)+CHR$(18)+CHR$(1
    88)+CHR$(146)+CHR$(156)+CHR$(185)
    :rem 105
130 S$=S$+CHR$(31)+CHR$(175):Q=RND(1)*(W-
    7)+3+22*W:POKET+Q,164:POKEC+Q,5
    :rem 21
140 FORI=0TOW-1:FORJ=0TO7*RND(1)+3:Q=(21-
    J)*W+I:POKET+Q,160:POKEC+Q,2:NEXT:NEX
    T
    :rem 134
150 PRINTCHR$(142);CHR$(19);:Y%=4*RND(1)+
    1:FORI=1TOY%:PRINT:NEXT:X=0
    :rem 139
160 L$=CHR$(157):PRINTS$:L$:L$:L$:X=X+1:
    GETA$:IFAS$=""ANDX<W-4THEN160
    :rem 67
170 IFX=W-4THENPRINTTAB(X);CHR$(32);CHR$(
    32);CHR$(32);:GOTO150
    :rem 202
180 FORI=Y%+2TO22:Q=I*W+X+1:P=PEEK(T+Q)
    :rem 102
190 POKET+Q-W,32:POKET+Q,90:POKEC+Q,8*RND
    (1):IFP=32THENNEXT
    :rem 193
200 B=B+1:POKET+Q,32:IFI<22GOTO160
    :rem 251
210 IFP<>164THENFORI=0TO255:POKEC+Q,I:POK
    ET+Q,I:NEXT:PRINTC$;"YOU LOST":GOTO23
    0
    :rem 74
220 FORI=1TO50:POKET+Q,32+132*F:F=1-F:NEX
    T:PRINTC$;"YOU WON! ";B;"BOMBS"
    :rem 61
230 PRINT:PRINT"PRESS "CHR$(18);"RETURN";
    CHR$(146);" TO PLAY{2 SPACES}AGAIN"
    :rem 180
240 GETA$:IFAS$<>CHR$(13)THEN240
    :rem 254
250 RUN
    :rem 140

```

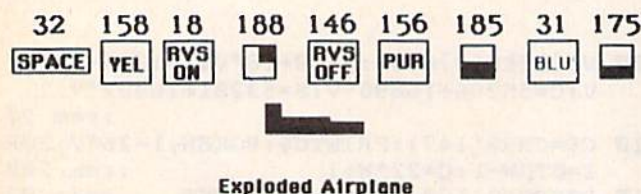
Game Description

When writing a game or analyzing one, it's often best to start at the top and work your way down. You analyze the "big picture" first, then descend into the details. The goal of Pudding Mountain Miner is to get the gold, represented by a dollar sign, by clearing away the mountain of chocolate

pudding. As the airplane flies across the screen, you press the space bar to drop a bomb. The bomb falls and takes out a piece of the mountain. You continue to chip away at the mountain until you expose the gold at the base. You can lose if you blast your way to the base without uncovering any gold. (By the way, originally the mountain was your ordinary kind, made of rock, but some here felt that blasting a mountain to bits was too violent. Hence, "Pudding Mountain.")

Program Overview

The airplane is made of character graphics from the built-in character set.



The computer moves the plane by drawing the airplane, then erasing it, then redrawing it one space forward. This cycle continues, and the plane appears to move across the screen. The mountain is made of solid squares (reverse-video spaces), and is built up column-by-column, by POKEing to the screen.

POKEing to the screen? You may think that you can POKE only to memory. How can you do a POKE that displays a character on the screen? The screen display is represented in the computer by a bank of memory locations. Each character has a numerical value that goes into *screen memory*. The number used is not in ASCII, which you may be familiar with if you've used CHR\$ and ASC in BASIC. The numbers used to represent characters are in a special order, the screen code. A complete table of screen codes is given in an appendix in your user's manual. For example, the alphabet ranges from 1-26, instead of 65-90.

The color of each character goes into a parallel area of memory, *color memory*. There are eight colors on the VIC, 16 on the 64, numbered from 0-7 or 0-15. This is the number POKEd into a spot in color memory.

The screen on the VIC is made up of 23 lines of 22 characters. The 64 screen is 25 lines of 40 characters. Multiplying the two figures gives you the total number of characters on the screen, 506 on the VIC, and 1000 on the 64. To get a character on the screen, start with the starting location of screen memory (1024 on the 64, 7680 on the unexpanded VIC), then add in a

number from 0-505 (on the VIC) or 0-999 (on the 64) to get the location for where you want the character to go.

If you want to put the letter A on the screen at row 12 and column 20, the POKE would be:

POKE 7680+12*22+20,1 (unexpanded VIC)
POKE 1024+12*40+20,1 (64)

Note how the row (12) is multiplied by either 22 or 40, the width of the screen. You should also always set the color of the character you POKE onto the screen. Normally, you let PRINT take care of this for you, but when you are directly POKEing to the screen, you have to do all the work yourself. The starting location of color memory on the 64 is 55296, on the unexpanded VIC, 38400. It's ordered just like screen memory, from 0-999 on the 64 or 0-505 on the VIC. When you POKE to screen memory, also POKE to color memory. We'll use red as the color (red is the third color, and since colors start with 0, we use a value of two):

POKE 38400+12*22+20,2 (VIC)
POKE 55296+12*40+20,2 (64)

Naturally, you'll want to save the computer time, so you can solve the arithmetic to make the computer's job a little easier (and faster):

POKE 7964,1:POKE 38684,2 (VIC)
POKE 1524,1:POKE 55796,2 (64)

Why use POKE at all? Why won't PRINT serve? Well, POKE is more convenient than PRINT in that PRINT tends to be serial. It prints left to right. You can move the cursor to any position with cursor controls, but it's a little cumbersome to program. POKE gives you direct access to any location on the screen.

Also, PRINT can display to the screen, but there is no command in BASIC to read a character off the screen. In Pudding Mountain Miner, the bomb falls as long as there is a blank space underneath it. The program keeps dropping the bomb until it reads a solid character from the screen. The PEEK command is used to read memory, in this case, screen memory. It makes sense to use POKE when you must use PEEK, since the numbers are the same. For example, to see what character is at row 20 and column 3, use:

A=PEEK(8123) VIC (7680+20*22+3)
A=PEEK(1827) 64 (1024+20*40+3)

The numeric value of the character is returned in the variable A.

Line-By-Line Description

A line-by-line description is a good way to show how a program works. It's also a valuable reference tool when you come back to work on a big program months later.

```
100 V=(PEEK(0)=76):W=40+18*V:T=1024-
6656*V:C=55296+16896*V:S=53281+16402*V
```

This is a very busy line. First of all, we need to know which machine the game is running on, so that we can make adjustments as we go along. Location 0 on the VIC normally holds a 76, and you wouldn't find a 76 in location 0 on the 64. The expression in parentheses is asking for a comparison. Is PEEK(0)=76? If so, the variable V is set to -1 for true, or 0 for false. This kind of trick is valuable. It can save you time and memory in your programming. For example, to add 1 to a number, unless the number is greater than 5, we could use: N=N-(N<6). If N<6, the expression in parentheses evaluates to a -1, and N-1 is the same as N+1. When N is greater than 5, (N<6) comes out to 0, and N+0 does no addition.

So if the program is running on a VIC, V=(PEEK(0)=76) is -1, otherwise V=0 on the 64. We use this variable in the next statement. W stands for the width of the screen. W should be 40 for the 64, and 22 for the VIC. If V=-1 (VIC), then 18 will be subtracted from 40 (W=40+18*V), making W=22, otherwise 40-18*0 is still 40 for the 64. We use this same trick to resolve T to either 1024 (the start of screen memory on the 64) or 7680 (1024-6656*-1). And C is either 55296 for the 64, or 38400 for the VIC. The location used to change the background color of the screen, S, is also calculated for the VIC or 64. So we've already generalized the program. We can use the same program lines on the VIC or 64, since the values which are different are already out of the way. We can POKE to S and know that we are automatically POKEing to the right location for the right machine.

```
110 C$=CHR$(147):PRINTC$:POKES,1-26*V:
FORI=0TOW-1:Q=22*W+I
115 POKET+Q,160:POKEC+Q,7:NEXT
```

Here we define C\$ as the character value of Clear Screen. When we PRINT C\$, the screen clears. This is the same character as SHIFT-CLR/HOME. We could put this clear screen character inside quotes, but it's a strange character that's hard for people to type in without instructions (remember this program ran in a newspaper ad). The use of CHR\$ means that whoever types in the program won't have to worry about things like quote mode. This kind of programming is helpful when you intend to publish a program in printed form. C\$ is used whenever we want to clear the screen.

We next change the screen color to white. The statement POKE S,1-26*V resolves to POKE 53281,1 for the 64, or POKE 36879,27 on the VIC. We now draw the base of the mountain

across the bottom of the screen. The FOR-NEXT loop ranges from 0-21 or 0-39, according to the value of W, the width of the screen. Q is used as the offset from screen memory. The row number, 22, is multiplied by the column width, then we add in the column number, I (the index of the FOR-NEXT loop). We POKE T+Q (start of screen memory plus offset) with a solid square (screen-code value 160). The color is yellow (7).

```
120 S$=CHR$(32)+CHR$(158)+CHR$(18)+CHR$(
188)+CHR$(146)+CHR$(156)+CHR$(185)
130 S$=S$+CHR$(31)+CHR$(175):Q=RND(1)*
(W-7)+3+22*W:POKET+Q,164:POKE C+Q,5
```

Lines 120 and 130 build up the airplane figure one character at a time, using the graphics characters and reverse-field (again, refer to the figure). The string is built by concatenation, using the + sign. We then pick a random horizontal position for the gold (a green dollar sign), and POKE a dollar sign into screen memory, and green into color memory. Randomness makes a game different every time you play it.

```
140 FORI=0TOW-1:FORJ=0TO7*RND(1):
Q=(21-J)*W+I:POKET+Q,160:
POKEC+Q,2:NEXT:NEXT
```

We now build the mountain. The mountain is drawn left to right, one column at a time. Each column is from 1 to 8 characters high, with the height chosen randomly. We use two FOR-NEXT loops. The outer loop moves the index from left to right (0-21 or 0-39) and the inner loop indexes from top to bottom. We use the RND statement to change the limit of the inner FOR-NEXT loop each column. Inside the inner loop, we compute the character position using Q. The bottom of the mountain is row 21 (counting from 0). The index J is subtracted to get the current row within the loop. This is multiplied by the width of the screen, then the column (I) is added in. We then POKE this location with a solid red square (appears chocolate pudding brown if you adjust your TV and your imagination). The NEXTs close up the loops, drawing the entire mountain.

```
150 PRINTCHR$(142);CHR$(19);Y%=4*RND
(1)+1:FORI=1TOY%:PRINT:NEXT:X=0
```

We print CHR\$(142), which forces the display to uppercase, then CHR\$(19), the HOME key, which puts the cursor in the upper left corner of the screen. We now pick a random row for the airplane, so that it will choose a new height each time. We now execute some PRINTs within a loop to put the cursor from 1 to 4 lines down on the screen. Finally, we initialize X to 0. X will be used below for the horizontal position of the airplane. We want to start from left to right.

```
160 L$=CHR$(157):PRINTSS;L$;L$;L$;X=X+1:
    GETA$:IFAS=""ANDX<W-4THEN160
```

L\$ is defined as cursor-left, which is shorter to type than CHR\$(157) over and over again. When printed, a cursor-left moves the cursor to the left one space. We print the airplane (the whole airplane is stored in the variable S\$), then back the cursor onto the first character of the airplane. We'll print spaces on top of the airplane to erase it, then redraw the plane to make it move. The variable X, used to represent the horizontal position of the plane, is upped to the next position of the plane. We also check here for a bomb being dropped. If any key is pressed, and if the plane hasn't reached the far right edge of the screen, we go to the part of the program that drops the bomb. Otherwise, we continue to the next line.

```
170 IFX=W-4THENPRINTTAB(X);CHR$(32);CHR$(32);CHR$(32);GOTO 150
```

If the plane has reached the right edge of the screen (IF X=W-4), we use TAB to put the cursor on the plane, CHR\$(32) (a blank space) to erase the plane, then we restart the plane at the left side of the screen by jumping back to line 150.

```
180 FORI=Y%+2TO22:Q=I*W+X+1:
    P=PEEK(T+Q)
190 POKET+Q-W,32:POKET+Q,90:POKEC+Q,
    8*RND(1):IFP=32THENNEXT
```

The plane is on row Y%, previously calculated on line 150. The bomb should drop from underneath the plane. We start a FOR-NEXT loop to represent the vertical position of the bomb, from 2 characters under the plane to where the bomb reaches the base of the mountain. Q is used again to calculate the screen position of where we'll put the bomb. We PEEK the intended position of the bomb so we can see later if we've hit something, then erase the previous bomb character (even if this is the first time through the loop, where there would be no bomb). Animation looks better if you erase the old shape, then draw the new one—instead of immediately drawing and erasing, which causes more flickering. We next POKE in a character for the bomb, and color it randomly. As long as the bomb falls onto spaces (IF P=32), we continue to drop the bomb. The FOR-NEXT loop ends when something has been hit.

```
200 B=B+1:POKET+Q,32:IFI<22GOTO160
```

The bomb has hit something, so we add one to the variable B, which represents the total number of bombs used. We then erase the bomb left by the loop. As long as the loop never made it to the base, we've just chipped away at the mountain, and it's time to continue moving the airplane (IF I<22 GOTO 160). By the way, it's

perfectly legal to use GOTO after an IF without THEN.

```
210 IFP<>164THENFORI=0TO255:POKEC+Q,I:
    POKET+Q,I:NEXT:PRINTC$;"YOU
    LOST":GOTO230
```

Since (IF I<22) failed, line 210 is executing, so the bomb hit a character at the base of the mountain. If what the bomb hit (P) is not equal to 164, the value of the dollar sign, then the player has chipped his way into the base, destroying the mountain. We create a mediocre explosion by POKEing the characters from 0-255 into screen and color memory, then inform the player of his demise. We jump to line 230 to wait for the player to press any key to play again.

```
220 FORI=1TO50:POKET+Q,32+132*I:F=1-F:
    NEXT:PRINTC$;"YOU WON! ";B;"BOMBS"
```

The IF statement on line 210 had to fail in order to get here, so the player must have bombed the dollar sign. The goal is achieved; the game is over. We blink the position of the dollar sign by alternating between a space and a dollar sign. When F=1, 32+132*I resolves to 164, the value of the dollar sign, and we POKE in a 32 (the space character) when F=0. The statement F=1-F makes F alternate between 0 and 1. We print the message informing the player how many bombs he used, then fall through to the next line.

```
230 PRINT:PRINT"PRESS ";CHR$(18);"RETURN";
    CHR$(146);" TO PLAY AGAIN"
240 GETA$:IFAS<>CHR$(13)THEN240
250 RUN
```

We use CHR\$(18) to make the word "RETURN" show up in reverse-video, to remind the player that we mean to press the RETURN key, not the individual letters R-E-T-U-R-N. In line 240, we wait for the RETURN key, which has a value of 13, to be pressed. After RETURN is pressed, the game reruns.

Program Evolution

This is such a small program, there is plenty of room for enhancements. A great way to learn programming is to modify other people's programs. You customize "canned" software to your taste, then use your knowledge to write programs of your own. The game can be made more complex. It's crying out for sound effects. Try using custom characters for a really professional look. Add more rules, even more screens. It's up to you. I'd be interested in seeing what you come up with. Even if you're not interested in games, this program is actually drawing bar graphs (the mountain). You can use these tricks to master screen formatting and can also learn a lot about writing applications programs by studying games.

WE'LL BEAT IT OR EAT IT!

In the unlikely event anybody has a lower price than our's on the software and peripherals advertised below, we'll beat it by at least one dollar or eat the product. It's much easier to beat their prices than eat a disk, so guess what we're going to do! *

TUSSEY MOUNTAIN SOFTWARE

- NEXT DAY SHIPPING on in-stock items
- ORDER WITH CONFIDENCE we honor manufacturer's warranties
- VISA and MASTERCARD ACCEPTED
- FREE 20 PAGE CATALOG

Toll Free Order Line: **800-468-9044**

Information and PA Orders: 814-234-2236

Phone lines open 10-8 Mon-Fri, 10-5 Sat

THE PANASONIC KXP 1091 PRINTER

Near letter quality at the flick of a switch

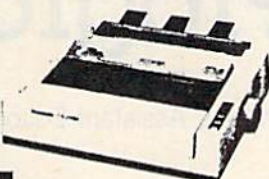
The 1091 zips along at 120 cps and has a 1k buffer. It also has all the print modes of the Gemini 10X and Epson RX-80, plus a BIG difference. The 1091 has a near letter quality switch. Flip it and you get a super tight 12 by 18 matrix with characters that rival a daisy wheel! The 1091 has both friction and tractor feed.

Our price \$279.00

Panasonic KXP 1090 \$199.00

(does not have near-letter quality)

SG 10, NLQ Dot Matrix from Star Call



PRINTERS

Gemini 10X	\$234.00*	Cardco LQ1 letter quality printer	\$459.00
Gemini 15X	\$377.00*	Cardco LQ3	\$349.00
Delta 10, 160 cps, 8k buffer	\$389.00*	Epson RX-80	\$244.00
Delta 15	\$580.00*	Epson Printers	Call
Powertype, 18 cps, letter quality	\$329.00*	Okidata Printers	Call

PRINTER INTERFACES

Xetec GPI	\$ 76.99
Xetec SPI/B	\$ 59.99
Xetec SPI	\$ 43.99
Cardco 77-G	\$ 67.00
Cardco 7/B	\$ 44.00
Cardco PS Interface	Call

DATABASES

The Consultant	\$ 63.99
Mirage Database Manager/ Report Generator	\$ 69.99
Superbase 64(d)	\$ 56.99
Data Manager II by Timeworks	\$ 32.99
Practifile by MS(d)	\$ 37.00

MODEMS

Total Telecom (1650 compatible)	\$ 76.95
Commodore 1660 New!	Call
Compuserve starter kit	\$ 26.95
Westridge modem	\$ 76.95
Mighty Mo. new modem from USI	\$ 78.99
VP terminal package by Softlab	\$ 39.95
Vidtex Terminal	\$ 30.00
Vidtex plus Compuserve Starter	\$ 49.99

WORD PROCESSORS

Word Processor by Proline(d)	\$ 39.99
Wordpro 3+/64 w/spellright(d)	\$ 59.00
Paperclip(d)	\$ 59.00
Paperclip w/spellpack(d)	\$ 76.99
Cardco Write Now/64 (cart)	\$ 37.00
Mirage Professional W/P (d)	\$ 59.00
Omni Writer/Spell(d)	\$ 45.00
Word Writer(d) by Timeworks	\$ 32.99
Script 64	\$ 39.99

CARDCO

Light pen	\$ 29.00
Numeric keypad	\$ 35.00
5 slot exp. interface CB/5	\$ 58.00
Mail Now/64	\$ 32.00
Spell Now	Call
File Now	Call
Graph Now	Call

To Order By Mail: Send personal check, money order, or certified check. Allow 2 weeks for personal checks to clear.

Shipping: Software and accessories add \$2.50 per order—COO order add \$6.00 (cod is not accepted on printers, monitors, and disk drives)—Printers add \$10.00—Disk Drives and Monitors add \$8.00.

Terms: Orders shipped UPS unless noted otherwise. All prices reflect cash discount. Add 3% for Visa and Mastercard. Manufacturer's warranty honored with our invoice and original packaging. PA residents add 6% sales tax. Prices subject to change. All sales final. Defective products replaced or repaired at our discretion.

* **Terms of Offer:** Offer valid only against prices advertised in this magazine, this issue, under the same terms. We are not responsible for typographical errors or manufacturer's price changes. Have the following information ready for our operators: (1) magazine name, (2) month of issue, (3) advertiser with lower price, (4) price to beat.

"DEALER INQUIRIES INVITED" Other product lines available! Call for prices.

NEW PRICES!

Commodore 64 is \$147.00*

*With the purchase of any printer, disk drive, monitor, or modem.

1541 Disk Drive	\$195.00
1702 Color Monitor	\$195.00
1660 Modem	Call
Plus 4, C-16, others	Call
SX 64	Call

NEW PRINTER FROM STAR!

The SG-10 is an upgrade of the popular Gemini 10X. It runs at 120 CPS, and has all the print modes of the 10X. What makes this printer different is a near letter quality mode at 60 CPS, with a 17 by 11 matrix! With this mode the printer does double duty, eliminating a need for a letter quality printer. It also includes a built in 2k buffer, and a 1 year warranty.

PLEASE CALL FOR OUR LOW PRICE!

BUY A BUNDLE— SAVE A BUNDLE

Order one of these popular packages of products by number for super savings!

Package #5
WORD PROCESSOR 64 and SPELLPRO 64
The word processor and spelling checker from Proline Software
\$73.99

Package #6
1541 EXPRESS and the FAST CABLE
Everything you need to speed up your disk drive
\$119.99

Package #7
CONSULTANT and PAPERCLIP W/ SPELLPACK
These are the popular Database and Word Processor from Batteries Included
\$129.99

Package #9
**MIRAGE DATABASE/ADVANCED REPORT GENERATOR and
MIRAGE PROFESSIONAL WORD PROCESSOR**
A powerful package that integrates together
\$124.95

Package #10
BI-80 and PAPERCLIP W/ SPELLPACK
The 80 column card with the Basic 4.0 built in, and the Paperclip w/spellpack both from Batteries Included. Paperclip works with the 80-column card to give you a powerful word processor
\$209.95

COMMODORE PRODUCTS NOW IN STOCK!
CALL FOR PRICE ON +4, C16, others

TUSSEY MT. SOFTWARE and Peripherals

BOX 1006
STATE COLLEGE, PA 16804

NoZap: Automatic Program Saver

J. Blake Lambert, Assistant Editor

→ This short, useful disk routine automatically saves updated versions of the BASIC program you're working on. It also works with some ML assemblers, and is especially useful for those who live in areas where power dropouts frequently occur. For the Commodore 64 and VIC-20 with or without expansion.

If you've ever been zapped by a power dropout or a loose power plug and seen the ominous reset message, you know how it feels. The cost is high: your time and your work. It's easy to say *always make periodic backup copies as you type in or write programs*. But when the ideas are flowing, it's also easy to forget or procrastinate. "NoZap" does more than remind you—it does the save for you, periodically and automatically.

NoZap is not a surge protector (it won't protect your computer from hardware damage resulting from a power spike). But it will protect you from momentary electric dropouts and loose connections that can cost you time and effort. Once you've run NoZap and entered a filename, it will save the current version of the program every ten minutes with an updated filename. You don't have to do anything you don't normally do—the operation is totally transparent. Every ten minutes, NoZap waits until you finish the line you're working on, and when you press RETURN to enter the line, it automatically saves.

NoZap even works with some programming utilities and typing aids. For example, it works

with the Automatic Proofreader, but not SpeedScript or MLX. (Since MLX is a BASIC program, NoZap will back up the MLX program rather than the ML program you're entering.) It works with the DOS 5.1 and VIC Wedges, as well as with some assemblers, such as PAL and LADS.

NoZap keeps track of the size of the program you're working on, as well as automatically stamping a version number onto the beginning of the filename. NoZap can accommodate as many as 100 versions, numbered 01-99 (after 99, the version number rolls over to 00).

There are a couple of limits which NoZap cannot work around: disk space and directory space. If there are not enough blocks free, the program won't be saved. And the directory can hold no more than 144 filenames.

Using NoZap

To use NoZap, load and run Program 1 (for the VIC) or Program 2 (for the 64); these are BASIC loaders. The program POKes a machine language program into the current top of BASIC memory and protects it from BASIC variables. Program 1 works with all VIC configurations (with or without memory expansion). NoZap also uses memory from 739-767, so be careful to avoid putting any ML routines there.

After you've run NoZap, the title line appears, and on the next line you see the prompt:

FILENAME?

Enter a filename (without quotes) from zero to fourteen characters long and press RETURN.

(Don't try to use a filename longer than fourteen characters, as this can cause your computer to lock up.) You don't need to include the version number, since NoZap adds that for you. Next, type NEW and press RETURN. From this point on, simply program as you normally would. NoZap is in charge of your saves, although you may continue to use the normal SAVE command. The first time NoZap saves, it uses a version number of 01. For example, if you enter THOR as the filename, the first version will be 01THOR, the second, 02THOR, and so on. NoZap reports the disk status, but will not retry if there is an error.

Forced Saves And Toggling

Occasionally you may want to save a new version before the next NoZap save. Or you may want to turn NoZap off for a while. To do so, use these commands:

```
SYS 739 (forced save)
SYS 745 (toggle off and on)
```

Typing SYS 739 increments the version number and saves the program. NoZap resets its timer so the next save will occur ten minutes later.

If you want to turn NoZap off, type SYS 745. This SYS acts as a *toggle*, so if you SYS 745 again, NoZap will restart as if it had been run for the first time.

Zapping NoZap

NoZap has been written to prevent it from interfering with your programming— RUN/STOP—RESTORE *does not deactivate it*. Turn the computer off then on again, or SYS 64738 on the 64, or 64802 on the VIC.

There are also ways to trick NoZap to your advantage. For example, if you stop at 04THOR one evening, the next time you program, run NoZap, entering the filename THOR again. To defeat saves, open the gate on the disk drive (and remove the disk if you like). To bump the version number up, SYS 739 repeatedly until you reach the desired number. Leaving the gate open will also help you avoid saving something in memory that you don't wish to save (like the disk directory). You may have to initialize the drive (or turn it off and on) to get it to respond after this, since the drive protects itself by not repeatedly trying to operate with the gate open.

Wild Cards And Pattern Matches

Since the version numbers are at the beginning of the filename, you can list all the versions of THOR with

```
LOAD"$0:??THOR",8
LIST
```

or, using the wedge command,

```
@$0:??THOR
```

If the program name is long, you may want to use pattern matching as well. For example, versions of THORSREVENGE could be viewed with the wedge command,

```
@$0:??THORS*
```

This is subject to the normal rules of pattern matching.

When you have a final version, you may want to do a normal save of the program, using a unique name, like FINALTHOR. You can then scratch all of the NoZap-saved versions of THOR with the following wedge command:

```
@S0:??THOR
```

Note that it's usually best not to use pattern matching when scratching files to avoid erasing files accidentally.

How NoZap Works

NoZap takes advantage of the fact that many BASIC and Kernal routines are *vectored*. A vector is like a road sign that tells the computer the location of a routine. Since the vector is in RAM, it can be changed to point to your own routine, the same way a detour sign guides you when traffic is rerouted. A program that uses such a detour is called a *wedge*.

NoZap sets up a detour in the Main BASIC Loop, the part of BASIC that takes in program lines as they are entered (in direct mode). As a result, BASIC will take the NoZap detour each time you press RETURN. When you run NoZap and enter a filename, the name is placed in a filename buffer, just after the current version number. The vector at locations \$302-303, which points to the Main BASIC Loop, is altered, and one of the computer's internal timers is set to zero. It is this timer that NoZap checks as you enter each program line. The 64 version uses one of the 64's TOD (time of day) clocks at locations \$DC08-DC0A, and the VIC version checks the jiffy clock at locations \$A0-\$A2. (Tape operations will affect the timer in the VIC version.) If the timer has not counted to ten minutes, NoZap sends the computer back to the Main BASIC Loop (at \$A483 in the 64, \$C483 in the VIC). This completes the NoZap detour.

Since NoZap wedges into the Main vector at \$302-303, it is not compatible with programming utilities which use the same technique. You may have to experiment to find out which utilities will work with NoZap in place. Another source of conflict is programs that want to use the same section of memory.

Clock Strikes Ten

If the timer has counted up far enough, NoZap continues, adding one to the version number in the filename buffer, then using the Kernal SETNAM, SETLFS, and SAVE routines. NoZap determines what area of memory to save by looking at the pointers to the start and end of BASIC program text (\$2B-2C and \$2D-2E, respectively). Then it checks the error channel and finishes the SAVE routine, returning to the Main Loop again.

The above description is brief, so use a machine language monitor to disassemble NoZap if you wish to look at all of the details. In addition, the BASIC loader POKES in two short routines. The first, which starts at 739 decimal, sets the timer to trick NoZap into thinking the time is up. This forces an earlier save.

The second routine is a NoZap pointer. Located at 745, the routine consists of a JUMP to the starting address of the NoZap initialization routine. When you run the BASIC loader, this address is placed in its correct form in addresses 746-747. This means that no matter where NoZap locates, you can toggle it on and off with SYS 745.

Customizing NoZap

After you've typed in, saved, and tested the BASIC loader for your computer, you may want to customize it to suit your preferences. One easy modification is to change the interval between saves. While the normal value is ten minutes, NoZap maintains a counter which allows you to use an interval of 20 minutes or more. To change the time between saves to 20 minutes, for example, change the 1 in line 42 to a 2. Change it to 3 for 30 minutes, and so on. You must also increase the checksum number in line 102 by the same amount as you increase the counter value.

One side effect of changing the interval is that you must SYS 739 repeatedly to do a forced save. For example, if you change the counter value to 2, you must SYS 739 twice to do a forced save, and three times if the counter is set to 3. To avoid this problem, a simpler way to force a save when the counter is set to 2 or higher is

POKE 750,1: SYS 739

NoZap can be a lifesaver. It can take the worry out of losing files unexpectedly and let you concentrate on programming.

See program listings on page 123.

from the "Commodore Consultants", your No. 1 Source!

NEW PRODUCTS! PRICES . . .

Call for information on new products.
CATALOGS: Free upon written request.



GEMINI 10X
120 CPS with
Cardco + G **CALL!**

PRINTERS

Powertype Daisywheel 18 CPS with Cardco B	\$354	Epson RX 80 with Tymac Connection . . .	\$299
Okidata 92 160 CPS with Tymac Connection	429	Commodore MPS 802 . . .	279

Call for prices on other models.

PRINT SHOP \$32.00

DISK DRIVES

MSD Super Drive	Call	Commodore 1541	Call
Indus GT	Call	Phonemark Datasette . . .	\$29
One Kay Data Drive	Call	Epyx Fast Load	27

MONITORS

Teknika MJ10	\$239	Zenith ZVM Gr/Amb . . .	\$89/99
Commodore 1702	Call		

COMPUERVE STARTER KIT
AND VIDTEX
Get both for only . . .

\$39.95



MODEMS

Westridge 6420	\$75	VIP Terminal	\$44
Mighty Mo	75	Commodore 1660	79

DATABASE MANAGERS

The Consultant	\$62	• NEW • NEW • NEW •	
Super Base 64	49	PFS:File	\$59
The Manager	35	PFS:Report	Call

WORD PROCESSORS

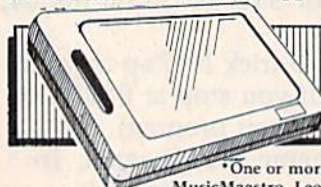
Paper Clip	\$59	Easy Script	\$35
w/speller	79	Easy Spell	17

SPREADSHEETS

Calc Result Easy/Adv . . .	\$35/65
MultiPlan	65

DISKETTES

Xidex SS/DD	\$16
Data Case 50	13



CHALKBOARD
*With Software
Purchase **\$19.95**

*One or more programs at \$15: Leo's Links, BearJam, MusicMaestro, Leo's Paintbrush, LogicMaster, Programming

ACCESSORIES

Com Cool Drive Fan	\$49	Power Pak	\$27
Com Cool Plus w/ surge . . .	\$69	Surge Protector 4-Plug . . .	27

BLACK NAUGAHYDE COVERS

C-64 or 1541 Drive . . . ea.	\$5	1702 Monitor	\$10
MSD Drives 1/2	5/6	1525/MPS 801	7
Gemini 10X	9	1526/MPS 802	8

MOST ORDERS SHIPPED WITHIN 48 HOURS! Advertised prices are for bank check or money order. VISA/MC orders add 3.5%. NO C.O.D. ORDERS. Personal or company checks delay orders 21 days. All sales are final - defective merchandise exchanged for same product only. Add 3% for shipping (\$2.50 min.) Please call for shipping on monitors. Ohio residents add 5.5% sales tax. Prices & availability subject to change. HOURS: MON-FRI 10 AM to 10 PM • SAT 10 AM to 5 PM • SUN Noon to 5 PM

800-638-2617

INFORMATION & IN OHIO 216/758-0009

BIG BYTES

1301 BOARDMAN-POLAND ROAD POLAND, OHIO 44514

1526 Hi-Res Screen Dump

Michael Frantz

Load this program into your 64, type one command, and get a high-resolution screen dump on your Commodore 1526 printer.

The October 1984 GAZETTE contained a program for printing hi-res screens to the Commodore 1525 and MPS-801 printers. Unfortunately, owners of the Commodore 1526 still had no way of printing their hi-res pictures. This program solves that problem.

"1526 Hi-Res Screen Dump" is written in machine language (ML). A BASIC program reads in the ML program from DATA statements and POKES it into memory above BASIC at 49152. An internal checksum (in addition to the one used with "Automatic Proofreader") tells you if you've made any typing errors.

Program operation is simple. Load 1526 Hi-Res Screen Dump first, and type RUN. Next, load the hi-res screen or the program that generates it. With the hi-res picture displayed, type **SYS 49152** "blindly" (that is, you won't see the characters you're typing—they're not on the hi-res screen) and the picture will begin printing on the 1526. Because the program automatically finds the starting location of the hi-res screen, you must be able to see the screen when you SYS or the program won't know where to find the location of the hi-res screen.

There are two ways to execute the program. The first is described above; the other is to issue the command from within a program. For example, you can append a line with the SYS command to the end of a program that draws a hi-res screen. If the last line in your hi-res program is 940, you can add **950 SYS49152** to execute the dump.

If you wish to print a hi-res screen without the hi-res screen displayed, these POKES must be made:

POKE 49198,169

POKE 49199, (with high byte of screen starting address)
POKE 49200,76
POKE 49201,60
POKE 49202,192

Note that these POKES will disable the routine that calculates the address of the hi-res screen, so you'll have to do the calculations. Also, these POKES can be appended to your hi-res program by giving them line numbers. The SYS command will again be the last program line.

See program listing on page 140.

Now everyone can afford to enter the exciting world of SPEECH SYNTHESIS!! Why pay \$149, \$129, or even \$79? For only \$39.95, you can have a SPEECH SYNTHESIZER with features that many of the more expensive units don't have.

Check these features :

UNLIMITED VOCABULARY

GREAT TEACHING AID

SIMPLE PROGRAMMING

... and more! Advanced technology makes this one of the most versatile and affordable SPEECH SYNTHESIZERS anywhere! Order today, and start making the most of your computer investment!

Send \$39.95 + \$2.00 shipping and handling to :

JV CIRCUITS
1209 Hunter Ct.
Addison, IL 60101

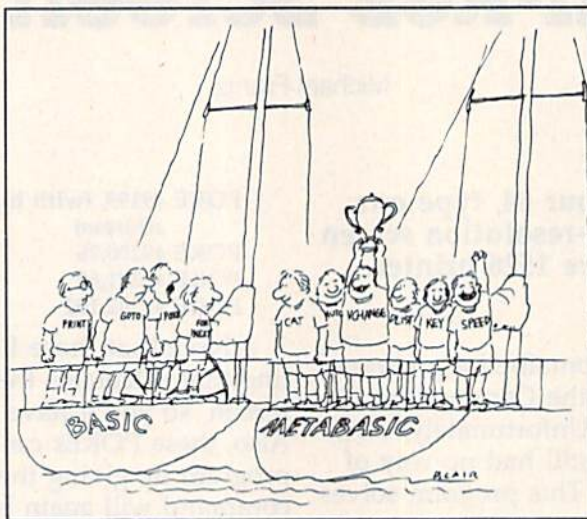
Specify VIC-20 or COMMODORE 64.

IL residents add 6.25% sales tax.

MetaBASIC: Programmer's Problem Solver

Kevin Mykytyn, Editorial Programmer

Here's a utility that will change the way you program. It adds 32 new debugging and testing commands to Commodore 64 BASIC, working by itself or in conjunction with a machine language monitor/assembler.



You've bought your first car and it runs well. But when you take it out on the highway, you're dismayed to find that it won't go faster than 45 miles per hour. What do you do?

Take it to your favorite mechanic and he might give you three options: Remove the engine and replace it with a brand new one. Or add some fancy turbo-charging fuel-injected doohickeys to the engine you already have. Or, without adding anything, you could tune it up, using a special machine that measures the engine's performance.

A BASIC Tune-Up

You can add new programming commands to your 64 in three similar ways. The first is to toss out BASIC and create a whole new language (a more powerful engine) based on your ideas of what a programming language should do.

The second method, a language extension, keeps BASIC but adds some new programming commands (for sound, high-res graphics, or other specialized functions). You keep the BASIC engine, but add some additional parts which make it work faster or more efficiently. *Simons' BASIC* and the *Super Expander 64* are examples of an extension.

The third way is like a tune-up which doesn't change the engine. You add direct mode commands for debugging. This is not a new language or even an extension of BASIC, it's more

properly called a *development system* or *writing/debugging tool*. The new commands you add cannot be used inside a program, they work only in immediate mode.

New languages and extensions have several advantages. But they also have a major drawback: You have to load the lan-

guage or extension *before* you load the main program, or the program just won't work.

The nice thing about a development system like "MetaBASIC" is that it's there when you need it, during the time you're writing and tuning up a program. But once you've finished the program, you don't need MetaBASIC to run it—you can disconnect the tune-up machine.

An Introduction To MetaBASIC

MetaBASIC uses English mnemonics, so you don't have to memorize a lot of SYS numbers. And if you forget the new words, you can either refer back to this article or type HELP.

BASIC programmers have 12 new commands at their fingertips. For writing programs, AUTO, KEY, and UNNEW. For examining and altering programs, CHANGE, DELETE, FIND, RENUM, and VCHANGE. And DUMP, SPEED, TRACE, and TROFF help during debugging sessions.

If you're writing in machine language, you can use some of the BASIC problem solvers, as well as MEMORY, MONITOR, NUMBER, and @.

To control MetaBASIC, you have DEFAULT, HELP, INT, and QUIT.

Disk commands include BSAVE, CAT, DLIST, ERR, MERGE, READ, RESAVE, SCRATCH, SEND, and START.

Finally, there's LLIST if you have a printer, and TERMINAL if you have a modem.

FOR COMMODORE 64™

TRACKMIMIC™

- Disk Back-up System for all disks including latest protection schemes.
- Used in conjunction with Diskmimic 5+™
- Unique "Comparatrak" Method insures accurate reproduction.
- Fully Automatic Back-up.
- No Formatting necessary (formats as it writes the copy).
- Installs in 1541 drives.

Software & Hardware Included

Only \$89.95

DISKMIMIC 5+™

- Copy Disks Automatically
- Backs up virtually all existing disks for Commodore 64™ including Copy Protected Versions, ALL AUTOMATICALLY.
- Supports 1541™ Drives.
- Don't be without back-up!
- Formats disk in less than 20 seconds.

**Now 3 Times as Fast!
BACKS UP ENTIRE COPY
PROTECTED DISKS IN LESS
THAN 8 MINUTES!!**

ONLY \$49.95

A.I.D. CORP.

4020 HEMPSTEAD TURNPIKE
BETHPAGE, NEW YORK 11714
(516) 731-7100

Diskmimic 5™ is a trademark of A.I.D. Corporation
Commodore 64™ & 1541™ is a trademark of
Commodore Electronics Ltd.

Shipping & Handling — \$1.50 each

Program Your Own EPROMS

▶ VIC 20 **\$99.50**
▶ C 64



PLUGS INTO USER PORT.
NOTHING ELSE NEEDED.
EASY TO USE. VERSATILE.

- Read or Program. One byte or 32K bytes!

OR Use like a disk drive. LOAD,
SAVE, GET, INPUT, PRINT, CMD,
OPEN, CLOSE—EPROM FILES!

Our software lets you use familiar BASIC commands to create, modify, scratch files on readily available EPROM chips. Adds a new dimension to your computing capability. Works with most ML Monitors too.

- Make Auto-Start Cartridges of your programs.
- The *promenade*™ C1 gives you 4 programming voltages, 2 EPROM supply voltages, 3 intelligent programming algorithms, 15 bit chip addressing, 3 LED's and NO switches. Your computer controls everything from software!
- Textool socket. Anti-static aluminum housing.
- EPROMS, cartridge PC boards, etc. at extra charge.

• Some EPROM types you can use with the *promenade*™

2758	2532	462732P	27128	5133	X2816A*
2516	2732	2564	27256	5143	52813*
2716	27C32	2764	68764	2815*	48016P*
27C16	2732A	27C64	68766	2816*	

▶ *Commodore Business Machines

*Denotes electrically erasable types

Call Toll Free: 800-421-7731
In California: 800-421-7748



JASON-RANHEIM

580 Parrott St., San Jose, CA 95112



promenade™

ATTENTION COMMODORE 64 OWNERS

We'll pay for your mistake!

We know that it's difficult, especially since everyone is trying to come out with one. Now that error track protection is going the way of the dinosaur, you probably purchased an obsolete piece of software. Well, we will give you \$25.00 credit* for any original copy utility software disk that you would like to trade in for the "NEW REVISED CLONE MACHINE." Our program can now back up non-standard sectors with complete control, detect and reproduce density-frequency alterations, alter the number of sectors on a track, sync to particular reference sectors (including a single sync Bit copy) PLUS reformat a single track.

Other back up programs have only recently caught up with our ability to reproduce errors. Included is fast clone as well as all of the other standard Clone features, we've even made it more user friendly too! THE CLONE MACHINE was the first of its kind and others followed. Well, we still feel that it's time for the other to try to play catch up again.

STILL ONLY \$49.95

**OUR SPECIAL MSD VERSION
NOW AVAILABLE TOO!**



Micro-W.
DISTRIBUTING, INC.

1342 B Route 23
Butler, N.J. 07405

Call: (201) 838-9027 To Order

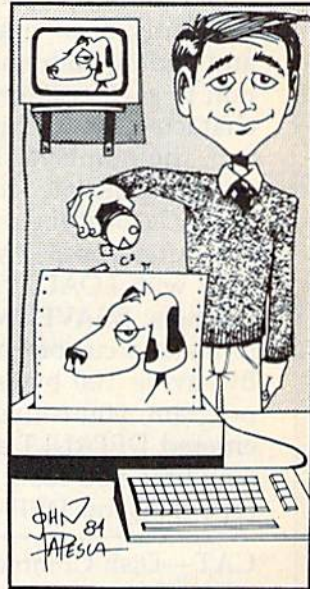
*NOTE: Micro-W reserves the right to cancel this offer at any time without notice

SCREEN DUMPER 64™ COPYRIGHT 1984 BY MICRO-W DISTRIBUTING INC.

How would you like to have a copy of all of the text or graphics that appear on your monitor screen? Well SCREEN DUMPER 64™ may be what you are looking for. This program will transfer to your printer* a copy of what you see on your monitor screen including hi-resolution graphics, text, and multicolor sprite, etc. It even works with the KOALA PAD™. You can load this program into your computer in a hidden location so that it shouldn't interfere with your programs. This means that you can use your Commodore 64 normally and then call up this routine to dump what is on the screen. Colors are represented by 16 shades of gray for faithful reproductions.

**ALL THIS FOR ONLY
\$29.95**

Call: (201) 838-9027 To Order



Micro-W.
DISTRIBUTING, INC.

1342 B Route 23
Butler, N.J. 07405

MetaBASIC Commands

Here's an alphabetical list of the new commands and how to use them, with examples. MetaBASIC commands and strings appear in **boldface** and numbers appear in *italics*. Anything enclosed in parentheses is optional.

If something is described as a disk command, it won't work unless you have a disk drive. However, some of the ML programming aids can be useful in BASIC and vice versa.

AUTO—BASIC Programming

Syntax: **AUTO** *startnum, increment*

AUTO can take some of the drudgery out of writing a program. It automatically numbers a program, starting at the first number, incrementing by the second. Separate the numbers with a comma. After you press RETURN over a line, the next number is automatically printed. The current line number can be changed by using the INST/DEL (delete) key and replacing it with another number.

Press RUN/STOP to escape from AUTO.

Example: **AUTO100,10** starts at 100 and numbers by 10.

BSAVE—Disk Command (see also RESAVE)

Syntax: **BSAVE** "**filename**", *start address, end address + 1*

BSAVE (Binary SAVE) saves a chunk of memory to disk, from the starting address to the ending address. Put the program name inside quotation marks, and use commas to separate the name, starting address, and ending address. It's important that you add one to the actual ending address. You can use this command to make backups of machine language programs, as long as you know the starting and ending addresses. BSAVE can also function to save sections of screen memory, custom character sets, or high-res screens.

The numbers should be in decimal. If you need to translate from hexadecimal to decimal, see NUMBER (below).

After you BSAVE to disk, you can load it back with LOAD "*filename*",*8,1*.

Example: **BSAVE "METABASIC" ,36864 ,40961** to make a customized backup of MetaBASIC. By saving 100 bytes past the actual end of the program, you conveniently save all previously entered DEFAULT and KEY definitions. The next time you load the BSAVED MetaBASIC, type INT and DEFAULT to regain them.

CAT—Disk Command (see also DLIST, READ)

Syntax: **CAT**

Anytime you want to look at the entire disk directory, use CAT (for CAtalog). The BASIC program currently in memory will remain un-

disturbed. To see specific portions of the directory, see DLIST.

CHANGE—BASIC Programming (see also FIND, VCHANGE)

Syntax: **CHANGE @OLD@NEW@**
(*startnum, endnum*)

or **CHANGE @"OLD"@"NEW"@**
(*startnum, endnum*)

CHANGE searches through the program in memory, changing every occurrence of the old string to the new one. The strings can be up to 30 characters long, and must be bracketed by the commercial at sign (@). All lines in which changes are made are listed to the screen.

The first format will change BASIC commands and variable names. The second format should be used to change strings. If you omit the line numbers, CHANGE affects the whole program. If you want to change only one section, add the starting and ending line numbers, marked off by commas.

Example: **CHANGE @X@QQ@,1,200** changes the variable X to QQ in lines 1-200. To change the name Charles to John throughout the program, **CHANGE @"CHARLES"@"JOHN"@**.

DEFAULT—MetaBASIC Command (see also INT, QUIT)

Syntax: **DEFAULT** *border, background, text, device#*

When you hit RUN/STOP-RESTORE, the screen reverts to the default colors of light blue characters on a dark blue screen, whether you like it or not. And several commands like LOAD and SAVE default to tape. DEFAULT lets you change these values to whatever you prefer.

If you have a disk drive, you can change the device number to 8. If you want to use your second drive (device nine) for SAVES, change the default to 9. If your 64 is hooked up to a black-and-white TV, change the character/background color to a more readable combination.

Note: You cannot use any of the new disk commands once you change the default device number to 1 (tape). To disable DEFAULT (and go back to normal), use the MONITOR

command below.

Example: **DEFAULT1,1,0,8** changes border and background to white, characters to black, and device number to 8. If you press RUN/STOP-RESTORE, you'll see black characters on a white background. And you'll be able to type **SAVE"filename"** (without adding a ,8).

DELETE—BASIC Programming

Syntax: **DELETE** *startnum-endnum*

DELETE removes a range of lines from your program. Separate the starting line number from the ending number with a dash (-).

Example: **DELETE200-250** erases lines 200-250.

DLIST—Disk Command (see also CAT, READ)

Syntax: **DLIST** "*filename*"

This command lists a BASIC program from disk to the screen, without affecting what's currently in memory. The program name must be enclosed in quotation marks. DLIST enables you to look at a program before using MERGE or SCRATCH.

It also allows you to read portions of the directory. **DLIST "\$:A*"** displays all disk files beginning with the letter A.

Example: **DLIST "BASICPROGRAM"** reads the file from disk and lists it to the screen.

DUMP—BASIC Programming

Syntax: **DUMP**

Use DUMP to examine the current values of all non-array variables in a program. If the program is running, press RUN/STOP and type DUMP. To resume, type CONT.

ERR—Disk Command

Syntax: **ERR**

ERR reads the disk error channel. Use it when the red light on the disk drive starts blinking.

FIND—BASIC Programming (see also CHANGE, VCHANGE)

Syntax: **FIND** **@string@** (*startnum, endnum*)
or **FIND** **@"string"@** (*startnum, endnum*)

This allows you to find any word, variable, or other string within a program. Each line containing the search string is listed to the screen. If you wish to search just one section of the program, add the starting and ending line numbers, separated by commas.

If you're trying to find BASIC keywords

(like PRINT or REM), use the first format. It also works for variables and numbers. The second format should be used when you're looking for strings or items inside quotation marks.

Example: **FIND @A=@** searches for lines where variable A is defined.

HELP—MetaBASIC Command

Syntax: **HELP**

Whenever you are unsure of the commands available in MetaBASIC, type HELP for a complete list.

INT—MetaBASIC Command (see also DEFAULT, QUIT)

Syntax: **INT**

Some features of MetaBASIC are interrupt-driven. If you reset the interrupts (with the MONITOR command), the function keys and the SPEED function may no longer work. INT puts the interrupts back in place.

KEY—BASIC Programming (see also INT)

Syntax: **KEY** *function#*, "**command or string**"

This command adds a lot of flexibility to MetaBASIC, allowing you to define each of the eight function keys as a different command or string.

The command, up to ten letters in length, must be inside quotation marks. There are two special characters. The back arrow acts as a carriage return, so you don't have to press RETURN after BASIC commands. Also, the apostrophe (SHIFT-7) counts as a double quotation mark.

Using KEY, you can load other utilities you may own, and SYS to them with a tap of a function key. Or you can do a one-key RUN or LIST.

If you want to permanently define the function keys and screen/text colors, you can use KEY and DEFAULT and then BSAVE "MetaBASIC" using the starting and ending addresses above. The definitions will be saved along with the program.

If the interrupts are accidentally reset, you may have to use the INT command to re-enable the KEY function.

Examples:

KEY1,"{CLR}LIST100--" clears the screen and lists from line 100 on whenever you press f1 (the back arrow means RETURN will happen automatically). You could also abbreviate LIST with L SHIFT-I.

KEY7,"DATA" could be useful with automatic line numbering (see AUTO) if you're writing a program with a lot of DATA state-

ments. After entering a line, press RETURN and you'll see the next line number. Then press f7 and the word DATA automatically appears.

KEY2, "VERIFY"*-' defines f2 to print VERIFY"*'" plus a RETURN (note the apostrophes have been changed to quotation marks). If you've used DEFAULT to change the device number to 8, pressing f2 will automatically verify the program most recently saved to disk.

LLIST—Printer Command

Syntax: **LLIST** (*startnum-endnum*)

This command lists a program, but the listing is sent to a printer rather than to the screen. Line numbers are optional. The syntax for LLIST is identical to the regular LIST.

Example: **LLIST10-20** to list lines 10-20 to the printer.

MEMORY—ML Programming (see also @)

Syntax: **MEMORY** *start address (-end address)*

You can examine any section of memory with this command. Use decimal numbers (not hex) for the starting and ending addresses. The values in memory are displayed, six bytes per line, in decimal. In addition, the equivalent ASCII characters are printed in reverse to the right (if there's no corresponding ASCII character, a period is printed).

If you omit the ending address, MEMORY 43 for example, you'll see the contents of two bytes (43 and 44). This makes it easier to look at two byte pointers—like 43 and 44 which point to the beginning of BASIC memory.

To change memory, you can use the @ command, described below.

Example: Enter **MEMORY 41374-41474** and you'll see the first few error messages (note that the ASCII value of the last character is always added to 128). Or, load a BASIC program, and type **MEMORY 2048-2148** to see how programs are stored in memory.

MERGE—Disk Command

Syntax: **MERGE** "**program name**"

MERGE reads a program from disk, lists each line to the screen, and adds the line to the program in memory. If the programs have common line numbers, the program on disk takes precedence. Say they both contain a line 250. The line 250 from the disk program will replace line 250 in memory.

Before using this command, you may want to use DLIST to make sure you're merging the right program. And if there are

conflicting line numbers, you can use RENUM to renumber one of the two programs. If you want to merge just part of one program, use DELETE to eliminate the unwanted lines.

MONITOR—ML Programming (see also INT)

Syntax: **MONITOR**

If you have a machine language monitor in memory, you can enter it with MONITOR (providing it is enabled with a BRK). To use MetaBASIC with a monitor, you must load MetaBASIC, type NEW, and SYS36864. Next, load the monitor, type NEW, and SYS to the starting address (which will set up the BRK vector to point to the monitor).

MONITOR does several other things, as well. It changes border, background, and text colors back to their default values (light blue on dark blue). It also sets interrupts to normal, which disables the function key definitions (see KEY) and SPEED command. You can get them back with the INT command.

NUMBER—ML Programming

Syntax: **NUMBER** \$*hexnum*
or **NUMBER** *decnum*

NUMBER allows you to convert back and forth between decimal and hexadecimal. Put a dollar sign (\$) in front of hex numbers. In addition, the number is converted to low-byte/high-byte format (in decimal) and the equivalent binary number (marked by a percent sign).

Examples:

NUMBER \$100

256

0 1

%100000000

NUMBER 34

\$22

34 0

%100010

QUIT—MetaBASIC Command

Syntax: **QUIT**

This resets all vectors and disables all MetaBASIC commands. The one thing it does *not* do is restore the top of memory pointer. MetaBASIC is still protected from BASIC. Re-enter the program with SYS36864 or SYS9*4096.

READ—Disk Command (see also CAT, DLIST)

Syntax: **READ** "**seq filename**"

READ allows you to examine sequential disk files. The information in the file is displayed to

the screen, without altering whatever program is in memory.

In the rare case that you want to use the BASIC READ command from direct mode (to see if all DATA statements have been read), you can precede it with a colon.

RENUM—BASIC Programming

Syntax: **RENUM** (*startnum*)(*increment*)

This command renumbers the entire BASIC program in memory (you can't renumber just part of the program), starting at the specified line number. The increment size is optional; RENUM defaults to 10. If you omit the starting number, it will start at line 10.

In addition to renumbering BASIC lines, all references in GOTOs, GOSUBs, ON-GOTOs, ON-GOSUBs, IF-THENs, etc. are taken care of. One word of caution: GOTO is covered, but GO TO (with a space in the middle) is not. Use FIND before renumbering to look for occurrences of GO TO.

Example: **RENUM 100,20** renumbers a program, starting at line 100, counting up by 20s.

RESAVE—Disk Command (see also BSAVE)

Syntax: **RESAVE** "filename"

The disk command save-with-replace (SAVE "@:filename") first saves the program and then scratches the older version, so there must always be enough free space on the disk for the new version of the program. This can cause problems if you don't have enough available space.

Save-with-replace is also sometimes unreliable and should be avoided (although some experts dispute this).

RESAVE reverses the order—first it scratches the old version of your program from disk, and then does a regular SAVE, solving both of the above problems.

SCRATCH—Disk Command

Syntax: **SCRATCH** "filename"

SCRATCH does the same thing as OPEN 15,8,15: PRINT#15,"S0:filename": CLOSE 15, but it's easier to type. It scratches a file from the disk. If you have just inserted the disk into the drive, it's a good idea to initialize it first (see SEND). You can use wildcards to scratch more than one program—SCRATCH "A*" will get rid of all files beginning with the letter A.

Example: **SCRATCH "SPACEGAME"** removes the program named SPACEGAME from the disk.

SEND—Disk Command

Syntax: **SEND** "disk command"

This is a convenient way to send disk commands to channel 15. SEND "IO" initializes the drive, SEND "V0" validates the disk, SEND "R0:newname=oldname" renames a disk file, and so on. For more information about disk commands, see the 1541 User's Manual.

SPEED—BASIC Programming

Syntax: **SPEED** *number*

SPEED followed by a number from 0 to 255 changes the printing speed. The higher the number, the slower the speed. Try typing SPEED 255 (the slowest you can make it) and then list a program. You can get back to normal with SPEED 0. If it doesn't work, try using INT (see above) to correct the interrupts.

SPEED is also useful when you're using the TRACE command.

START—Disk Command

Syntax: **START** "filename"

If you forget where a machine language program begins, put the disk in the drive and use this command. This can help when you have forgotten the SYS that starts a program.

Example: **START "METABASIC"** should display 36864 on the screen.

TERMINAL—Modem Command

Syntax: **TERMINAL**

If you own a Commodore modem (and it's plugged into your 64), TERMINAL transforms your computer into a 300 baud "dumb" terminal you can use to talk to standard-ASCII bulletin boards or information services like CompuServe. You can't change any of the default parameters (like full-duplex), nor can you upload or download text or programs.

To return to BASIC, press the £ (English pound) key; do not press RUN/STOP-RESTORE. A note of caution: Memory locations 52736-53247 are used for buffers, so any program in this area will be overwritten.

TRACE—BASIC Programming (see also TROFF)

Syntax: **TRACE** followed by RUN.

If you're debugging a BASIC program, TRACE helps you see what's happening. As each line is executed, its line number is printed on the screen. Use the SHIFT or CTRL key to temporarily halt the program. SPEED controls the speed of execution, and TROFF turns off TRACE.

TROFF—BASIC Programming (see also TRACE)

Syntax: **TROFF**

This command turns off the TRACE function.

UNNEW—BASIC Programming

Syntax: **UNNEW**

You may never need this command, but it's nice to have it available. If you accidentally type NEW and you want to retrieve the program, use UNNEW to get it back.

VCHANGE—BASIC Programming (see also CHANGE, FIND)

Syntax: **VCHANGE @OLD@NEW@**

(,startnum, endnum)

or **VCHANGE @"OLD"@"NEW"@**

(,startnum, endnum)

VCHANGE (Verify CHANGE) works just like CHANGE (see above), except you get to choose whether or not the change is made. Each line containing the old string is dis-

played, with each occurrence of the string marked with a filled-in circle. If you press Y, the change is made. Press N if you want to skip to the next one.

@—ML Programming (see also MEMORY)

Syntax: **@ start address, number, number....**

This works like POKE, except it allows you to put a series of numbers into consecutive memory locations. For example, if you want to change border and background color to white, you would use @53280,1,1. The first 1 goes into 53280, the second into 53281. If you add more numbers, separated by commas, they are POKEd into the next locations: 53282, 53283, and so on.

You can also use this in conjunction with MEMORY. First, PEEK at a series of locations using MEMORY. Then change the information there by putting @ before each line you want to change. Cursor over to the number you want to change, change it, and press RETURN.

Typing It In

MetaBASIC is written entirely in machine language, and MLX is required to type it in.

If you don't already have a copy of MLX for the 64, type it in and save it to tape or disk.

The program resides at the top of memory, where BASIC programs (including MLX) store dynamic strings. To protect this section of memory, you must enter POKE644,144:SYS58260 before loading MLX. Otherwise, the variables will overwrite MetaBASIC. Then, load MLX and run it. Give it the following information:

Starting Address: 36864

Ending Address: 40805

Next, following the MLX instructions, enter MetaBASIC and save it.

To use MetaBASIC, follow these steps:

1. LOAD"MetaBASIC",8,1 (for disk) or LOAD"MetaBASIC",1,1 (tape).
2. Type NEW
3. SYS36864 (or SYS9*4096)

The program uses 4K at the top of BASIC memory (which leaves you with 35K for your programs). The first thing it does is move the top of BASIC pointer down, to protect itself from variables. After the SYS, it may seem that nothing is happening. But MetaBASIC is running in the background, and you now have 32 new com-

mands to help you write and debug programs.

Special Notes

Always type NEW after loading MetaBASIC.

One feature that works automatically is LIST Pause. When you're listing a program, hold down CTRL, SHIFT, or the Commodore key to temporarily halt it.

RUN/STOP-RESTORE is available in both program mode and direct mode. But if you want to interrupt any of the utilities like RENUM, use the RUN/STOP key by itself (not RUN/STOP-RESTORE).

The commands work only in direct mode; you cannot add them to programs. Also, you're limited to one command per line (although you can still use multi-statement lines inside your programs). Unlike ordinary BASIC commands, there are no abbreviations. You must type out the entire MetaBASIC command. If it seems to be working incorrectly, make sure the syntax is correct.

Machine language programmers should remember that MetaBASIC occupies memory locations \$9000-9FFF. The 4K which begins at \$C000 is available for programs like Micromon or for your own ML programs. Be sure to load and run MetaBASIC *before* loading any other programs. See program listing on page 141.

NEWS & PRODUCTS

Tax Package For 64

The 1985 version of Arrays, Inc./Continental Software's *The Tax Advantage* is now available for the 1984 tax year. The program aids in preparing forms 1040, 6251, 2106, 2441, and 4562, and schedules A, B, C, D, E, G, SE, and W.

It performs operations such as income averaging; itemizing wages, deductions, and assets; and computing the new alternate "minimum tax." The program is available on disk at a suggested price of \$69.95.

Arrays, Inc./Continental Software,
11223 S. Hindry Ave., Los Angeles, CA
90045

Circle Reader Service Number 223.

Updated Typing Tutorial

Scarborough Systems, Inc. has released an updated version of its typing instruction program, called *New Improved Mastertype*. It's available on disk and cartridge for the Commodore 64 at a suggested retail price of \$39.95.

The program teaches basic and advanced typing and keyboard skills by using a space-age game. Onscreen finger positioning, sentence and typing rhythm lessons, and improved accuracy and skill measurements have been added to the new version. The tutorial has 18 successive difficulty levels and is suitable for ages six to adult.

Scarborough Systems Inc., 25 N.
Broadway, Tarrytown, NY 10591

Circle Reader Service Number 224.

Productivity Packages, Books For 64

Abacus Software has announced 13 new programs and books for the Commodore 64. The books are priced from around \$15 each, while the software starts at \$39.95.

New language and development software includes: *Ada Training Course*, *BASIC-64 Compiler*, *C Language Compiler*, *Fortran Compiler*, and *Video Basic*

Development. New productivity packages are: *Cadpak-64* (design package); *Chartpak-64* (charting program); *Datamat-64* (data management program); and *Power Plan-64*, a spreadsheet with graphics. New book titles for the 64 are: *Cassette Book for C-64*; *More Tricks & Tips for C-64*; *Peeks and Pokes for C-64*; and *Turbo Pascal Training Guide*.

Abacus Software, 2201 Kalamazoo
S.E., P.O. Box 7211, Grand Rapids, MI
49510

Circle Reader Service Number 225.

64 Productivity Software

Batteries Included has introduced *HomePak*, a package of three integrated programs for home use. Included is *HomeText*, a word processor; *HomeFind*, a data management system; and *HomeTerm*, a terminal communications program.

The programs can be used separately or together. Data stored in *HomeFind* can be integrated with letters produced with *HomeText*, and *HomeText* can be used to write reports based on information called up via *HomeTerm*. Suggested retail price is \$49.95.

Batteries Included, 30 Mural St.,
Richmond Hill, Ontario, CANADA L4B
1B5.

Circle Reader Service Number 226.

Graphics, Chart Generator

Graph Now, a graphics and chart generator for the Commodore 64, has been released by Cardco, Inc., at a suggested retail price of \$39.95.

The program can generate line and bar graphs as well as graphic art designs. Graphics are generated with *Paint Now*, which is included. Both programs are compatible with Cardco's word processor, *Write Now*.

Cardco, Inc., 300 S. Topeka, Wichita,
KS 67202

Circle Reader Service Number 227.

Graphics Tablet For 64

Animation Station, a new graphics tablet for the Commodore 64 which features a printer/dump and built-in character set, has been introduced by Suncom.

Besides its use for graphics, *Animation Station* can also be utilized for writing. Included with the package is *DesignLab*, a color software program which has a built-in cut-and-paste feature which allows the user to electronically reposition elements on the screen.

Other software programs are available. Suggested retail price is \$79.95.

Suncom, 260 Holbrook Dr., Wheeling,
IL 60090

Circle Reader Service Number 228.

64 Construction Set

Adventure Construction Set, a program that allows one to four players to design graphics and text adventures, has been introduced by Electronic Arts. The suggested retail price for the Commodore 64 version is \$50.

Three programs are contained on the disk: *Adventure Construction Set*; *Rivers of Light*, an adventure set in Egypt and the Near East during the dawn of man; and *Land of Adventuria*, an adventuring tutorial for novices which contains seven mini-adventures, each based on a theme or a different kind of game that can be created with the construction set. These adventures can be modified by the player to help learn how to build adventures with ACS.

Electronic Arts, 2755 Campus Dr.,
San Mateo, CA 94403

Circle Reader Service Number 229.

New Product releases are selected from submissions for reasons of timeliness, uniqueness, available space, and general interest. Readers should be aware that News & Products often contains an edited version of material submitted by vendors. We are unable to vouch for its accuracy at time of publication.

The Automatic Proofreader

"The Automatic Proofreader" will help you type in program listings from COMPUTE!'s Gazette without typing mistakes. It is a short error-checking program that hides itself in memory. When activated, it lets you know immediately after typing a line from a program listing if you have made a mistake. Please read these instructions carefully before typing any programs in COMPUTE!'s Gazette.

Preparing The Proofreader

1. Using the listing below, type in the Proofreader. The same program works on both the VIC-20 and Commodore 64. Be very careful when entering the DATA statements — don't type an l instead of a 1, an O instead of a 0, extra commas, etc.

2. SAVE the Proofreader on tape or disk at least twice before running it for the first time. This is very important because the Proofreader erases this part of itself when you first type RUN.

3. After the Proofreader is SAVED, type RUN. It will check itself for typing errors in the DATA statements and warn you if there's a mistake. Correct any errors and SAVE the corrected version. Keep a copy in a safe place — you'll need it again and again, every time you enter a program from COMPUTE!'s Gazette.

4. When a correct version of the Proofreader is RUN, it activates itself. You are now ready to enter a program listing. If you press RUN/STOP-RESTORE, the Proofreader is disabled. To reactivate it, just type the command SYS 886 and press RETURN.

Using The Proofreader

All VIC and 64 listings in COMPUTE!'s Gazette now have a *checksum number* appended to the end of each line, for example *":rem 123". Don't enter this statement when typing in a program.* It is just for your information. The rem makes the number harmless if someone does type it in. It will, however, use up memory if you enter it, and it will confuse the Proofreader, even if you entered the rest of the line correctly.

When you type in a line from a program listing and press RETURN, the Proofreader displays a number at the top of your screen. *This checksum number must match the checksum number in the printed listing.* If it doesn't, it means you typed the line differently than the way it is listed. Immediately recheck your typing. Remember, don't type the rem statement with the checksum number; it is published only so you can check it against the number which appears on your screen.

The Proofreader is not picky with spaces. It will not notice extra spaces or missing ones. This is for your convenience, since spacing is generally not important. But occasionally proper spacing is important, so be extra careful with spaces, since the Proofreader will catch practically everything else that can go wrong.

There's another thing to watch out for: if you enter the line by using abbreviations for commands, the checksum will not match up. But there is a way to make the Proofreader check it. After entering the line, LIST it. This eliminates the abbreviations. Then move the cursor up to the line and press RETURN. It should now match the checksum. You can check whole groups of lines this way.

Special Tape SAVE Instructions

When you're done typing a listing, you must disable the Proofreader before SAVEing the program on tape. Disable the Proofreader by pressing RUN/STOP-RESTORE (hold down the RUN/STOP key and sharply hit the RESTORE key). This procedure is not necessary for disk SAVES, but you must disable the Proofreader this way before a tape SAVE.

SAVE to tape erases the Proofreader from memory, so you'll have to LOAD and RUN it again if you want to type another listing. SAVE to disk does not erase the Proofreader.

Since the Proofreader is a machine language program stored in the cassette buffer, it will be erased during a tape SAVE or LOAD. If you intend to type in a program in more than one sitting or wish to make a safety SAVE, follow this procedure:

1. LOAD and RUN the Proofreader.
2. Disable it by pressing RUN/STOP-RESTORE.
3. Type the following three lines in direct mode (without line numbers):

```
A$="PROOFREADER.T":B$="{10 SPACES}":FO
RX=1TO4:A$=A$+B$:NEXTX
FORX=886 TO 1018:A$=A$+CHR$(PEEK(X)):N
EXTX
OPEN1,1,1,A$:CLOSE1
```

After you type the last line, you will be asked to press RECORD and PLAY. We recommend you start at the beginning of a new tape.

You now have a new version of the Proofreader (PROOFREADER.T, as renamed in the above code). Turn your computer off and on, then LOAD the program you were working on. Put the cassette containing PROOFREADER.T into the tape unit and type:

```
OPEN1:CLOSE1
```

You can now get into the Proofreader by typing SYS 886. To test this, PRINT PEEK (886) should return the number 173. If it does not, repeat the steps above, making sure that A\$ (PROOFREADER.T) contains 13 characters and that B\$ contains 10 spaces.

The new version of Automatic Proofreader will load itself into the cassette buffer whenever you type OPEN1:CLOSE1 and PROOFREADER.T is the next program on your tape. It will not disturb the contents of BASIC memory.

Automatic Proofreader For VIC And 64

```
100 PRINT "{CLR} PLEASE WAIT...":FORI=886TO
1018:READA:CK=CK+A:POKEI,A:NEXT
110 IF CK<>17539 THEN PRINT "[DOWN] YOU MAD
E AN ERROR":PRINT "IN DATA STATEMENTS.
":END
120 SYS886:PRINT "{CLR} {2 DOWN} PROOFREADER
ACTIVATED.":NEW
886 DATA 173,036,003,201,150,208
892 DATA 001,096,141,151,003,173
898 DATA 037,003,141,152,003,169
904 DATA 150,141,036,003,169,003
910 DATA 141,037,003,169,000,133
916 DATA 254,096,032,087,241,133
922 DATA 251,134,252,132,253,008
928 DATA 201,013,240,017,201,032
934 DATA 240,005,024,101,254,133
940 DATA 254,165,251,166,252,164
946 DATA 253,040,096,169,013,032
952 DATA 210,255,165,214,141,251
958 DATA 003,206,251,003,169,000
964 DATA 133,216,169,019,032,210
970 DATA 255,169,018,032,210,255
976 DATA 169,058,032,210,255,166
982 DATA 254,169,000,133,254,172
988 DATA 151,003,192,087,208,006
994 DATA 032,205,189,076,235,003
1000 DATA 032,205,221,169,032,032
1006 DATA 210,255,032,210,255,173
1012 DATA 251,003,133,214,076,173
1018 DATA 003
```

NoZap

(Article on page 110.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: NoZap—VIC Version

```
2 POKE56,PEEK(56)-1:CLR:I=256*PEEK(56)+PE
  EK(55):S=I :rem 216
4 DEFFNH(X)=INT(X/256) :rem 37
6 DEFFNL(X)=X-FNH(X)*256 :rem 156
8 DATA169,141,141,161,0,96,76 :rem 202
10 FORJ=739TO745:READK:POKEJ,K:NEXT
   :rem 249
12 POKE746,PEEK(55):POKE747,PEEK(56)
   :rem 87
14 PRINT "SYS 739=FORCED SAVE.{2 SPACES}S
  YS 745=TOGGLE." :rem 241
16 READ A:B=B+A:IF A=256 THEN 102:rem 209
18 POKE I,A:I=I+1:GOTO 16 :rem 141
20 DATA 173,236,2,73,1,141 :rem 241
22 DATA 236,2,208,13,169,131 :rem 90
24 DATA 141,2,3,169,196,141 :rem 45
26 DATA 3,3,76,131,196,169 :rem 6
28 DATA 48,141,239,2,141,240 :rem 94
30 DATA 2,169,7,160,7,32 :rem 149
32 DATA 30,203,32,249,203,160 :rem 131
34 DATA 2,185,254,1,153,239 :rem 48
36 DATA 2,240,3,200,208,245 :rem 33
38 DATA 140,237,2,162,7,160 :rem 43
40 DATA 7,142,2,3,140,3 :rem 85
42 DATA 3,169,1,141,238,2:REM CHANGE THE
  {SPACE}1 FOR A LONGER INTERVAL:rem 239
44 DATA 169,0,133,160,133,161 :rem 139
46 DATA 133,162,165,161,56,201 :rem 194
48 DATA 141,144,116,206,238,2 :rem 144
50 DATA 208,236,238,240,2,173 :rem 144
52 DATA 240,2,201,58,208,20 :rem 33
54 DATA 169,48,141,240,2,238 :rem 102
56 DATA 239,2,173,239,2,201 :rem 47
58 DATA 58,208,5,169,48,141 :rem 65
60 DATA 239,2,173,237,2,162 :rem 46
62 DATA 239,160,2,32,189,255 :rem 104
64 DATA 169,1,162,8,160,0 :rem 201
66 DATA 32,186,255,169,43,166 :rem 166
68 DATA 45,164,46,32,216,255 :rem 108
70 DATA 169,141,32,210,255,169 :rem 199
72 DATA 0,32,189,255,169,15 :rem 56
74 DATA 162,8,168,32,186,255 :rem 113
76 DATA 32,192,255,162,15,32 :rem 100
78 DATA 198,255,32,207,255,201 :rem 208
80 DATA 13,240,6,32,210,255 :rem 34
82 DATA 56,176,243,32,210,255 :rem 150
84 DATA 169,15,32,195,255,32 :rem 109
86 DATA 204,255,76,7,7,76 :rem 222
88 DATA 131,196,18,78,79,90 :rem 76
90 DATA 65,80,146,32,66,89 :rem 15
92 DATA 32,66,76,65,75,69 :rem 229
94 DATA 32,76,65,77,66,69 :rem 233
96 DATA 82,84,13,70,73,76 :rem 221
98 DATA 69,78,65,77,69,0,256 :rem 134
102 IF B<>28586THENPRINT"ERROR IN DATA ST
  ATEMENTS.":END :rem 109
104 POKE S+32,FNL(S+206):POKES+34,FNH(S+2
  06) :rem 215
```

```
106 POKE S+58,FNL(S+80):POKES+60,FNH(S+80
  ) :rem 128
108 POKE S+201,FNL(S+67):POKES+202,FNH(S+
  67) :rem 224
110 SYS745 :rem 49
```

Program 2: NoZap—64 Version

```
2 POKE56,PEEK(56)-1:CLR:I=256*PEEK(56)+PE
  EK(55):S=I :rem 216
4 DEFFNH(X)=INT(X/256) :rem 37
6 DEFFNL(X)=X-FNH(X)*256 :rem 156
8 DATA169,16,141,10,220,96,76 :rem 200
10 FORJ=739TO745:READK:POKEJ,K:NEXT
   :rem 249
12 POKE746,PEEK(55):POKE747,PEEK(56)
   :rem 87
14 PRINT "SYS 739=FORCED SAVE. SYS 745=TO
  GGLE." :rem 241
16 READ A:B=B+A:IF A=256 THEN 102:rem 209
18 POKE I,A:I=I+1:GOTO 16 :rem 141
20 DATA 173,236,2,73,1,141 :rem 241
22 DATA 236,2,208,13,169,131 :rem 90
24 DATA 141,2,3,169,164,141 :rem 40
26 DATA 3,3,76,131,164,169 :rem 1
28 DATA 48,141,239,2,141,240 :rem 94
30 DATA 2,169,7,160,7,32 :rem 149
32 DATA 30,171,32,249,171,160 :rem 139
34 DATA 2,185,254,1,153,239 :rem 48
36 DATA 2,240,3,200,208,245 :rem 33
38 DATA 140,237,2,162,7,160 :rem 43
40 DATA 7,142,2,3,140,3 :rem 85
42 DATA 3,169,1,141,238,2:REM CHANGE THE
  {SPACE}1 FOR A LONGER INTERVAL:rem 239
44 DATA 169,0,141,8,220,141 :rem 38
46 DATA 9,220,141,10,220,173 :rem 83
48 DATA 10,220,41,240,240,117 :rem 129
50 DATA 206,238,2,208,233,238 :rem 145
52 DATA 240,2,173,240,2,201 :rem 27
54 DATA 58,208,20,169,48,141 :rem 106
56 DATA 240,2,238,239,2,173 :rem 49
58 DATA 239,2,201,58,208,5 :rem 2
60 DATA 169,48,141,239,2,173 :rem 105
62 DATA 237,2,162,239,160,2 :rem 44
64 DATA 32,189,255,169,1,162 :rem 109
66 DATA 8,160,0,32,186,255 :rem 1
68 DATA 169,43,166,45,164,46 :rem 118
70 DATA 32,216,255,169,141,32 :rem 146
72 DATA 210,255,169,0,32,189 :rem 101
74 DATA 255,169,15,162,8,160 :rem 107
76 DATA 15,32,186,255,32,192 :rem 106
78 DATA 255,162,15,32,198,255 :rem 163
80 DATA 32,207,255,201,13,240 :rem 133
82 DATA 6,32,210,255,56,176 :rem 51
84 DATA 243,32,210,255,169,15 :rem 149
86 DATA 32,195,255,32,204,255 :rem 155
88 DATA 76,7,7,76,131,164 :rem 222
90 DATA 18,78,79,90,65,80 :rem 227
92 DATA 146,32,66,89,32,66 :rem 15
94 DATA 76,65,75,69,32,76 :rem 232
96 DATA 65,77,66,69,82,84 :rem 239
98 DATA 13,70,73,76,69,78 :rem 231
100 DATA 65,77,69,0,256 :rem 112
102 IF B<>28715THENPRINT"ERROR IN DATA SA
  TEMENTS.":END :rem 19
104 POKE S+32,FNL(S+210):POKES+34,FNH(S+2
  10) :rem 205
106 POKE S+58,FNL(S+83):POKES+60,FNH(S+83
  ) :rem 134
108 POKE S+205,FNL(S+67):POKES+206,FNH(S+
  67) :rem 232
110 SYS745 :rem 49
```

Pool

(Article on page 50.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: VIC Version

```
14 POKE36879,10:PRINT"{CLR}{YEL}":rem 110
16 PRINT"FIRST PLAYER NAME.":rem 220
18 PRINT:INPUTN$ :rem 50
20 A$=LEFT$(N$,7) :rem 121
22 PRINT:PRINT:PRINT"SECOND PLAYER NAME.
   " :rem 155
24 PRINT:INPUTN$ :rem 47
26 B$=LEFT$(N$,7) :rem 128
28 PRINT"{CLR}":rem 206
30 D=1:Q0=7981:B0=87:B1=81:B=B0:C=1 :rem 167
40 POKE37154,127:POKE36878,15 :rem 104
70 FORP=38511TO38863STEP22 :rem 44
80 FORZ=0TO19 :rem 35
90 POKEP+Z,7 :rem 208
100 NEXTZ:NEXTP :rem 243
110 B=B0:Q=Q0 :rem 204
120 POKEQ,B :rem 129
130 GOSUB3030 :rem 218
500 REM PLAY :rem 175
510 IFD=1THENGOSUB1000 :rem 71
520 GOSUB2500 :rem 222
530 IFPEEK(Q+I)<>32THENGOSUB2000 :rem 178
540 IFPEEK(Q+I)<>32THENGOSUB2500 :rem 184
545 IFPEEK(Q+I)<>32THENGOSUB2000 :rem 184
550 POKEQ,32 :rem 171
560 Q=Q+I :rem 238
565 IFB=B0THENQC=Q :rem 113
570 POKEQ,B :rem 138
580 IFI=0THEN510 :rem 167
590 FORT=0TOD:NEXTT :rem 250
600 D=D*1.2 :rem 22
610 IFD>200THENI=0:D=1:H=0:IFB=B1THENB=B0
   :Q=QC:POKEQ,B :rem 89
620 IFD=1THENGOSUB3007 :rem 82
630 GOTO510 :rem 104
1000 REM CUE CONTROL :rem 163
1005 REM AIM :rem 129
1010 IFS=1THENGOSUB6000 :rem 135
1020 FORV=1TO8 :rem 73
1030 IFV=1THENI=-1:Z=67 :rem 104
1040 IFV=2THENI=-23:Z=77 :rem 159
1050 IFV=3THENI=-22:Z=93 :rem 158
1060 IFV=4THENI=-21:Z=78 :rem 162
1070 IFV=5THENI=1:Z=67 :rem 67
1080 IFV=6THENI=23:Z=77 :rem 122
1090 IFV=7THENI=22:Z=93 :rem 121
1100 IFV=8THENI=21:Z=78 :rem 116
1110 A=PEEK(Q-I) :rem 126
1120 POKEQ-I,Z :rem 64
1130 FORT=0TO100:NEXTT :rem 110
1140 POKEQ-I,A :rem 41
1150 GOSUB7000 :rem 14
1160 IFJ=0ANDK=64THEN1110 :rem 197
1170 IFJ=32ORK=39THEN1200 :rem 203
1180 NEXTV :rem 95
1190 GOTO1000 :rem 197
1200 REM BALL SPEED :rem 51
1210 FORD=1TO100STEP10 :rem 46
1220 V$=STR$(100-(D-1)) :rem 155
1240 PRINT"{HOME}{2 DOWN}SPEED";V$+" " :rem 98
1260 FORT=0TO300:NEXTT :rem 116
1280 GOSUB7000 :rem 18
1300 IFJ=0ANDK=64THEN5000 :rem 195
1310 NEXTD :rem 72
1320 GOTO1200 :rem 194
2000 REM BOUNDARIES :rem 146
2010 IFPEEK(Q+I)=102THENH=1:GOTO3000 :rem 120
2020 IFPEEK(Q+22)=102THENH=1:GOTO3000 :rem 148
2030 IFPEEK(Q-22)=102THENH=1:GOTO3000 :rem 151
2040 IFPEEK(Q+I)=100THENI=I+44:GOTO5000 :rem 39
2050 IFPEEK(Q+I)=99THENI=I-44:GOTO5000 :rem 11
2060 IFPEEK(Q+I)=103THENI=I+2:GOTO5000 :rem 246
2070 IFPEEK(Q+I)=101THENI=I-2:GOTO5000 :rem 247
2080 RETURN :rem 170
2500 REM BALL COLLISION :rem 114
2510 IFI=0THENRETURN :rem 28
2520 IFPEEK(Q+I)=B0THENPOKEQ,B:B=B0:Q=Q+I
   :GOTO5000 :rem 79
2530 IFPEEK(Q+I)=B1THENPOKEQ,B:B=B1:Q=Q+I
   :GOTO5000 :rem 82
2540 IFPEEK(Q+1)=B1THENPOKEQ,B:B=B1:Q=Q+1
   :GOTO5000 :rem 35
2550 IFPEEK(Q-1)=B1THENPOKEQ,B:B=B1:Q=Q-1
   :GOTO5000 :rem 40
2560 IFPEEK(Q-22)=B1THENPOKEQ,B:B=B1:Q=Q-
   22:GOTO5000 :rem 143
2570 IFPEEK(Q+22)=B1THENPOKEQ,B:B=B1:Q=Q+
   22:GOTO5000 :rem 140
2580 RETURN :rem 175
3000 REM SCORING :rem 188
3005 IFB=B0THENI=0:D=1:POKEQ,32:Q=Q0:H=0:
   S=1 :rem 151
3007 IFH=0THENC=-C:GOSUB5400 :rem 176
3010 IFC<0THEN3500 :rem 249
3020 IFH=1THENSA=SA+1:POKEQ,32:GOSUB5200
   :rem 198
3030 PRINT"{HOME}{RVS}"A$;SA"{OFF}";TAB(1
   1)B$;SB :rem 193
3040 IFB=B1THENH=0:I=0:D=1:Q=QC:B=B0 :rem 143
3045 PRINT"{HOME}{2 DOWN}SPEED 100" :rem 212
3050 FORP=7768TO8183 :rem 143
3060 IFPEEK(P)=B1THENRETURN :rem 221
3070 NEXTP :rem 89
3080 GOSUB4000 :rem 15
3090 RETURN :rem 172
3500 IFH=1THENSB=SB+1:POKEQ,32:GOSUB5200
   :rem 203
3510 PRINT"{HOME}"A$;SA;TAB(11)"{RVS}
   {CYN}"B$;SB"{OFF}{YEL}":rem 69
3535 IFSA+SB=15THEN9000 :rem 78
3540 GOTO3040 :rem 204
4000 REM SET TABLE :rem 252
4100 FORP=7770TO7777:POKEP,100:NEXT :rem 124
4106 FORP=7780TO7787:POKEP,100:NEXT :rem 132
4120 FORP=8166TO8173:POKEP,99:NEXT:rem 86
```

```

4126 FORP=8176TO8183:POKEP,99:NEXT:rem 94
4160 FORP=7812TO8120STEP22:POKEP,103:NEXT
      :rem 17
4190 FORP=7833TO8141STEP22:POKEP,101:NEXT
      :rem 24
4220 POKE7768,102:POKE7769,102:POKE7790,1
      02 :rem 150
4230 POKE8164,102:POKE8165,102:POKE8142,1
      02 :rem 125
4240 POKE7789,102:POKE7788,102:POKE7811,1
      02 :rem 150
4250 POKE8185,102:POKE8184,102:POKE8163,1
      02 :rem 134
4260 POKE7778,102:POKE7779,102 :rem 157
4270 POKE8174,102:POKE8175,102 :rem 140
4300 FORN=1TO15 :rem 115
4310 P=7768+INT(396*RND(0)) :rem 201
4320 IFPEEK(P)<>32THEN4310 :rem 244
4330 IFPEEK(P+1)<>32THEN4310 :rem 81
4340 IFPEEK(P-1)<>32THEN4310 :rem 84
4350 IFPEEK(P+22)<>32THEN4310 :rem 134
4360 IFPEEK(P-22)<>32THEN4310 :rem 137
4370 IFPEEK(P+21)<>32THEN4310 :rem 135
4380 IFPEEK(P-21)<>32THEN4310 :rem 138
4390 IFPEEK(P+23)<>32THEN4310 :rem 139
4400 IFPEEK(P-23)<>32THEN4310 :rem 133
4410 POKEP,B1 :rem 231
4420 NEXTN :rem 87
4430 RETURN :rem 171
5000 REM BUMP SOUND :rem 102
5005 D=D*1.2 :rem 74
5010 POKE36875,180 :rem 199
5020 FORT=0TO10:NEXTT :rem 64
5030 POKE36875,0 :rem 96
5040 RETURN :rem 169
5200 REM SCORE SOUND :rem 176
5210 FORS=0TO2 :rem 68
5220 POKE36876,220 :rem 198
5230 FORT=0TO20:NEXTT :rem 68
5240 POKE36876,0 :rem 100
5245 FORT=0TO20:NEXTT :rem 74
5247 IFSA+SB=15THEN9000 :rem 80
5250 NEXTS :rem 94
5260 RETURN :rem 173
5400 REM TURNOVER SOUND :rem 187
5410 POKE36875,135 :rem 203
5420 POKE36874,201 :rem 197
5430 FORT=0TO500:NEXTT :rem 121
5440 POKE36875,0 :rem 101
5450 POKE36874,0 :rem 101
5460 RETURN :rem 175
6000 REM SCRATCH :rem 178
6005 REM DRAW LINE :rem 5
6010 FORP=7782TO8156STEP22 :rem 42
6020 IFPEEK(P)=32THENPOKEP,103 :rem 45
6030 NEXTP :rem 88
6035 REM MOVE CUEBALL :rem 225
6040 V=1 :rem 142
6500 GOSUB7000 :rem 18
6505 IFJ=0ANDK=64THEN6500 :rem 213
6510 IFJ=4ORJ=8ORK=47THENI=V*22 :rem 163
6520 IFJ=1ORJ=16ORK=55THENI=V*1 :rem 156
6530 IFPEEK(Q+I)<>32THENV=-V:I=-I:rem 242
6535 IFJ=32ORK=39THEN6580 :rem 229
6540 POKEQ,32:Q=Q+I:QC=Q :rem 201
6550 POKEQ,B :rem 190
6570 GOTO6500 :rem 214
6580 GOSUB7000 :rem 26
6590 IFJ=0ANDK=64THEN6600 :rem 218
6595 GOTO6580 :rem 229
6600 REM ERASE LINE :rem 72
6605 FORP=7782TO8156STEP22 :rem 52
6610 IFPEEK(P)=103THENPOKEP,32 :rem 50
6620 NEXTP :rem 93
6630 S=0 :rem 143
6640 RETURN :rem 176
7000 REM READ JOYSTICK :rem 55
7010 J=(NOTPEEK(37151))AND60-((PEEK(37152)
      )AND128)=0) :rem 99
7020 K=PEEK(197) :rem 104
7030 RETURN :rem 170
9000 PRINT"{CLR}{5 DOWN}{5 SPACES}PLAY AG
      AIN?":POKE198,0:PRINT"{2 DOWN}
      {8 SPACES}(Y/N)" :rem 18
9010 GETA$:IFA$="Y"THENRUN :rem 59
9020 IFA$<>"N"THEN9010 :rem 196

```

Program 2: 64 Version

```

49152 :169,012,141,021,208,169,208
49158 :255,141,059,099,141,060,249
49164 :099,169,001,141,001,088,255
49170 :169,000,141,051,099,032,254
49176 :024,197,032,206,203,169,087
49182 :255,141,021,208,032,209,128
49188 :195,032,093,197,032,163,236
49194 :197,032,248,204,169,000,124
49200 :141,062,099,141,063,099,141
49206 :173,001,088,208,115,162,033
49212 :000,142,057,099,189,004,039
49218 :208,201,070,240,006,201,224
49224 :235,240,008,208,097,238,074
49230 :062,099,076,086,192,238,063
49236 :063,099,232,232,224,012,178
49242 :208,228,162,022,160,012,114
49248 :024,032,240,255,173,058,110
49254 :099,201,001,208,003,076,178
49260 :027,206,173,062,099,205,112
49266 :063,099,240,036,176,017,233
49272 :169,238,160,204,032,030,185
49278 :171,169,184,160,205,032,023
49284 :030,171,076,161,192,169,163
49290 :227,160,204,032,030,171,194
49296 :169,184,160,205,032,030,156
49302 :171,076,161,192,169,171,066
49308 :160,205,032,030,171,169,155
49314 :060,133,162,165,161,197,016
49320 :161,240,252,076,000,192,065
49326 :173,001,088,240,003,032,199
49332 :010,195,169,000,141,001,184
49338 :088,141,061,099,032,226,065
49344 :192,169,000,141,164,096,186
49350 :141,032,096,141,000,088,184
49356 :032,042,193,162,009,032,162
49362 :112,193,202,208,250,032,183
49368 :118,193,173,000,088,240,004
49374 :226,076,043,192,173,002,166
49380 :208,141,000,208,201,175,137
49386 :144,004,169,254,208,003,248
49392 :024,105,080,141,053,099,230
49398 :173,000,208,056,233,080,228
49404 :141,054,099,173,003,208,162
49410 :141,001,208,201,165,144,094
49416 :004,169,245,208,003,024,149
49422 :105,080,141,056,099,173,156
49428 :057,099,208,017,173,001,063
49434 :208,201,130,176,004,169,146
49440 :050,208,003,056,233,080,150
49446 :141,055,099,096,174,000,091
49452 :208,172,051,099,185,000,247
49458 :220,172,001,208,074,176,133

```

49464 :007,136,204,055,099,176,221
49470 :001,200,074,176,007,200,208
49476 :204,056,099,144,001,136,196
49482 :074,176,007,202,236,054,055
49488 :099,176,001,232,074,176,070
49494 :007,232,236,053,099,144,089
49500 :001,202,074,176,008,169,210
49506 :001,141,032,096,141,000,253
49512 :088,142,000,208,140,001,171
49518 :208,096,160,000,136,208,150
49524 :253,096,173,032,096,208,206
49530 :003,076,143,194,169,000,195
49536 :141,112,096,141,096,096,042
49542 :173,000,208,056,237,002,042
49548 :208,046,112,096,141,000,231
49554 :096,173,001,208,056,237,149
49560 :003,208,046,096,096,141,230
49566 :016,096,173,112,096,208,091
49572 :011,173,000,096,073,255,004
49578 :141,000,096,238,000,096,229
49584 :169,004,141,128,096,173,119
49590 :096,096,208,011,173,016,014
49596 :096,073,255,141,016,096,097
49602 :238,016,096,160,000,185,121
49608 :112,096,240,028,185,000,093
49614 :101,024,121,000,096,153,189
49620 :000,101,185,002,208,105,045
49626 :000,201,198,144,003,032,028
49632 :144,194,153,002,208,076,233
49638 :001,194,185,000,101,056,255
49644 :249,000,096,153,000,101,067
49650 :185,002,208,233,000,201,047
49656 :106,176,003,032,144,194,135
49662 :153,002,208,185,096,096,226
49668 :240,028,185,032,101,024,102
49674 :121,016,096,153,032,101,017
49680 :185,003,208,105,000,201,206
49686 :194,144,003,032,181,194,002
49692 :153,003,208,076,059,194,209
49698 :185,032,101,056,249,016,161
49704 :096,153,032,101,185,003,098
49710 :208,233,000,201,090,176,186
49716 :003,032,181,194,153,003,106
49722 :208,032,199,197,172,162,004
49728 :096,200,200,192,014,240,238
49734 :003,076,199,193,202,240,215
49740 :003,076,197,193,206,128,111
49746 :096,208,248,032,065,205,168
49752 :169,004,141,128,096,162,020
49758 :012,189,000,096,029,016,180
49764 :096,201,006,176,228,169,208
49770 :000,157,000,096,157,016,020
49776 :096,202,202,016,234,169,007
49782 :000,141,032,096,162,014,051
49788 :157,000,096,157,016,096,134
49794 :202,016,247,173,061,099,160
49800 :208,005,169,001,141,001,149
49806 :088,096,072,032,190,205,057
49812 :162,001,185,112,096,073,009
49818 :001,153,112,096,185,003,192
49824 :208,201,192,176,043,201,157
49830 :093,144?,039,201,138,176,189
49836 :002,104,096,201,146,144,097
49842 :029,104,096,072,032,190,189
49848 :205,162,000,185,096,096,160
49854 :073,001,153,096,096,185,026
49860 :002,208,201,195,176,006,216
49866 :201,107,144,002,104,096,088
49872 :032,208,205,104,192,000,181

49878 :208,007,169,001,141,001,229
49884 :088,208,003,238,164,096,249
49890 :169,000,153,000,096,153,029
49896 :016,096,173,051,099,240,139
49902 :004,169,070,208,002,169,092
49908 :235,153,002,208,152,010,236
49914 :010,010,024,105,070,153,110
49920 :003,208,224,000,240,003,166
49926 :185,002,208,096,169,254,152
49932 :141,021,208,173,058,099,200
49938 :201,001,240,007,173,051,179
49944 :099,073,001,240,004,169,098
49950 :070,208,002,169,235,162,108
49956 :000,221,004,208,240,009,206
49962 :232,232,224,014,208,245,173
49968 :076,096,195,169,155,157,128
49974 :004,208,232,169,148,157,204
49980 :004,208,254,004,208,165,135
49986 :162,197,162,240,252,165,220
49992 :162,197,162,240,252,173,234
49998 :030,208,208,236,254,004,250
50004 :208,165,162,197,162,240,194
50010 :252,173,030,208,208,222,159
50016 :169,153,141,002,208,170,171
50022 :169,100,141,003,208,141,096
50028 :057,099,165,162,197,162,182
50034 :240,252,172,051,099,185,089
50040 :000,220,142,002,208,074,254
50046 :176,017,206,003,208,072,040
50052 :173,003,208,201,090,176,215
50058 :005,169,100,141,003,208,252
50064 :104,074,074,176,006,202,012
50070 :224,105,176,001,232,074,194
50076 :176,006,232,224,199,144,113
50082 :001,202,074,176,199,165,211
50088 :162,197,162,240,252,173,074
50094 :030,208,041,002,208,186,081
50100 :185,000,220,041,016,240,114
50106 :249,169,000,133,162,105,236
50112 :025,197,162,176,252,169,149
50118 :255,141,021,208,173,003,231
50124 :208,141,055,099,096,169,204
50130 :147,032,210,255,169,160,159
50136 :160,016,153,130,004,153,064
50142 :170,004,169,160,153,002,112
50148 :007,153,042,007,136,016,077
50154 :239,032,076,204,169,210,140
50160 :133,251,169,004,133,252,158
50166 :169,210,133,253,169,216,116
50172 :133,254,162,014,160,000,207
50178 :169,160,145,251,200,169,072
50184 :160,145,251,160,015,145,116
50190 :251,200,169,160,145,251,166
50196 :165,251,024,105,040,133,226
50202 :251,165,252,105,000,133,164
50208 :252,165,253,024,105,040,103
50214 :133,253,165,254,105,000,180
50220 :133,254,202,208,207,169,193
50226 :000,141,051,099,169,033,031
50232 :141,171,004,141,184,004,189
50238 :141,195,005,141,219,006,001
50244 :169,034,141,172,004,141,217
50250 :185,004,141,209,005,141,247
50256 :233,006,169,036,141,225,122
50262 :004,141,249,005,141,017,131
50268 :007,141,004,007,169,035,199
50274 :141,211,004,141,235,005,067
50280 :141,003,007,141,016,007,163
50286 :169,174,141,175,004,141,146

50292 :181,004,141,035,005,141,111
50298 :049,005,141,115,005,141,066
50304 :129,005,141,059,006,141,097
50310 :073,006,141,139,006,141,128
50316 :153,006,141,007,007,141,083
50322 :013,007,169,019,032,210,084
50328 :255,169,003,141,255,097,048
50334 :169,077,160,205,032,030,063
50340 :171,206,255,097,208,244,065
50346 :169,018,141,255,097,169,251
50352 :120,160,205,032,030,171,126
50358 :206,255,097,208,244,169,081
50364 :003,141,255,097,169,077,162
50370 :160,205,032,030,171,206,230
50376 :255,097,208,244,160,039,179
50382 :169,160,153,192,007,169,032
50388 :001,153,192,219,136,016,161
50394 :243,173,058,099,201,001,225
50400 :208,018,162,001,160,014,019
50406 :024,032,240,255,169,163,089
50412 :160,205,032,030,171,076,142
50418 :018,197,162,001,160,001,013
50424 :024,032,240,255,169,227,171
50430 :160,204,032,030,171,162,245
50436 :001,160,029,024,032,240,234
50442 :255,169,238,160,204,032,044
50448 :030,171,169,013,141,033,061
50454 :208,096,169,000,160,127,014
50460 :153,064,003,136,016,250,138
50466 :160,007,169,000,153,112,123
50472 :096,153,096,096,136,016,121
50478 :245,169,001,141,028,208,070
50484 :141,037,208,160,007,162,255
50490 :023,185,096,204,157,064,019
50496 :003,185,104,204,157,128,077
50502 :003,136,202,202,202,016,063
50508 :238,169,014,141,248,007,125
50514 :169,013,160,006,153,249,064
50520 :007,136,016,250,096,120,201
50526 :165,001,041,251,133,001,174
50532 :169,000,133,251,169,056,110
50538 :133,252,169,000,133,253,022
50544 :169,208,133,254,162,008,022
50550 :160,000,177,253,145,251,080
50556 :136,208,249,230,252,230,149
50562 :254,202,208,240,160,032,202
50568 :185,118,204,153,008,057,093
50574 :136,016,247,165,001,009,204
50580 :004,133,001,088,173,024,059
50586 :208,041,240,009,014,141,039
50592 :024,208,096,160,015,185,080
50598 :150,204,153,000,208,136,249
50604 :016,247,160,007,185,166,185
50610 :204,153,039,208,136,016,166
50616 :247,169,000,160,015,153,160
50622 :000,096,153,016,096,136,175
50628 :016,247,096,140,162,096,185
50634 :185,000,101,141,016,064,197
50640 :185,002,208,141,161,096,233
50646 :160,000,140,160,096,172,174
50652 :160,096,173,016,064,200,161
50658 :200,192,014,208,004,172,248
50664 :162,096,096,056,249,000,123
50670 :101,173,161,096,249,002,252
50676 :208,201,008,144,004,201,242
50682 :248,144,225,204,162,096,049
50688 :240,220,141,165,096,140,234
50694 :160,096,172,162,096,185,109
50700 :032,101,056,172,160,096,117

50706 :249,032,101,172,162,096,062
50712 :185,003,208,172,160,096,080
50718 :249,003,208,201,008,144,075
50724 :004,201,248,144,178,141,184
50730 :166,096,238,061,099,169,103
50736 :016,141,005,212,169,000,079
50742 :141,006,212,169,015,141,226
50748 :024,212,169,120,169,008,250
50754 :141,024,212,141,001,212,029
50760 :169,128,141,004,212,169,127
50766 :129,141,004,212,172,162,130
50772 :096,174,160,096,185,000,027
50778 :096,072,185,112,096,208,091
50784 :005,104,032,018,201,072,016
50790 :104,141,167,096,185,016,043
50796 :096,072,185,096,096,208,093
50802 :005,104,032,018,201,072,034
50808 :104,141,168,096,189,000,050
50814 :096,072,189,112,096,208,131
50820 :005,104,032,018,201,072,052
50826 :104,141,169,096,189,016,085
50832 :096,072,189,096,096,208,133
50838 :005,104,032,018,201,072,070
50844 :104,141,170,096,169,000,068
50850 :141,032,064,141,033,064,125
50856 :173,165,096,016,009,032,147
50862 :018,201,141,165,096,238,009
50868 :032,064,173,166,096,016,215
50874 :009,032,018,201,141,166,241
50880 :096,238,033,064,174,165,194
50886 :096,172,166,096,189,199,092
50892 :205,141,176,096,169,000,223
50898 :141,165,096,141,166,096,247
50904 :185,199,205,141,177,096,195
50910 :173,032,064,240,021,173,157
50916 :176,096,141,171,002,141,187
50922 :167,002,173,165,096,141,210
50928 :168,002,141,172,002,076,033
50934 :017,199,173,176,096,032,171
50940 :018,201,141,171,002,141,158
50946 :167,002,173,165,096,073,166
50952 :255,105,000,141,172,002,171
50958 :141,168,002,173,033,064,083
50964 :240,028,173,177,096,141,107
50970 :173,002,032,018,201,141,081
50976 :169,002,173,166,096,141,011
50982 :174,002,073,255,105,000,135
50988 :141,170,002,076,075,199,195
50994 :173,177,096,141,169,002,040
51000 :032,018,201,141,173,002,111
51006 :173,166,096,141,170,002,042
51012 :073,255,105,000,141,174,048
51018 :002,174,169,002,172,170,251
51024 :002,173,168,096,141,086,234
51030 :064,032,254,200,032,185,085
51036 :201,032,004,201,174,167,103
51042 :002,172,168,002,173,167,014
51048 :096,141,086,064,032,254,009
51054 :200,032,185,201,056,229,245
51060 :251,141,183,096,152,229,144
51066 :252,141,182,096,174,169,112
51072 :002,172,170,002,173,167,046
51078 :096,141,086,064,032,254,039
51084 :200,032,185,201,032,004,026
51090 :201,174,167,002,172,168,006
51096 :002,173,168,096,141,086,050
51102 :064,032,254,200,032,185,157
51108 :201,024,101,251,141,185,043
51114 :096,152,101,252,141,184,072

51120 :096,174,169,002,172,170,191
51126 :002,173,170,096,141,086,082
51132 :064,032,254,200,032,185,187
51138 :201,032,004,201,174,167,205
51144 :002,172,168,002,173,169,118
51150 :096,141,086,064,032,254,111
51156 :200,032,185,201,056,229,091
51162 :251,141,187,096,152,229,250
51168 :252,141,186,096,174,169,218
51174 :002,172,170,002,173,169,150
51180 :096,141,086,064,032,254,141
51186 :200,032,185,201,032,004,128
51192 :201,174,167,002,172,168,108
51198 :002,173,170,096,141,086,154
51204 :064,032,254,200,032,185,003
51210 :201,024,101,251,141,189,149
51216 :096,152,101,252,141,188,178
51222 :096,174,173,002,172,174,045
51228 :002,173,184,096,141,086,198
51234 :064,173,185,096,141,084,009
51240 :064,032,185,201,032,004,046
51246 :201,174,171,002,172,172,170
51252 :002,173,186,096,141,086,224
51258 :064,173,187,096,141,084,035
51264 :064,032,185,201,056,229,063
51270 :251,141,080,064,152,229,219
51276 :252,141,178,096,174,173,066
51282 :002,172,174,002,173,186,023
51288 :096,141,086,064,173,187,067
51294 :096,141,084,064,032,185,184
51300 :201,032,004,201,174,171,115
51306 :002,172,172,002,173,184,043
51312 :096,141,086,064,173,185,089
51318 :096,141,084,064,032,185,208
51324 :201,024,101,251,141,082,156
51330 :064,152,101,252,141,179,251
51336 :096,174,173,002,172,174,159
51342 :002,173,188,096,141,086,060
51348 :064,173,189,096,141,084,127
51354 :064,032,185,201,032,004,160
51360 :201,174,171,002,172,172,028
51366 :002,173,182,096,141,086,078
51372 :064,173,183,096,141,084,145
51378 :064,032,185,201,056,229,177
51384 :251,141,081,064,152,229,078
51390 :252,141,180,096,174,173,182
51396 :002,172,174,002,173,182,133
51402 :096,141,086,064,173,183,177
51408 :096,141,084,064,032,185,042
51414 :201,032,004,201,174,171,229
51420 :002,172,172,002,173,188,161
51426 :096,141,086,064,173,189,207
51432 :096,141,084,064,032,185,066
51438 :201,024,101,251,141,083,015
51444 :064,152,101,252,141,181,111
51450 :096,076,024,201,169,000,048
51456 :141,084,064,096,133,251,001
51462 :132,252,096,173,190,096,177
51468 :073,001,141,190,096,096,097
51474 :073,255,024,105,001,096,060
51480 :174,162,096,172,160,096,116
51486 :169,001,153,112,096,157,206
51492 :112,096,157,096,096,153,234
51498 :096,096,172,162,096,173,069
51504 :178,096,016,010,032,018,142
51510 :201,072,169,000,153,112,249
51516 :096,104,153,000,096,173,170
51522 :179,096,016,010,032,018,161
51528 :201,072,169,000,153,096,251

51534 :096,104,153,016,096,172,203
51540 :160,096,173,180,096,016,037
51546 :010,032,018,201,072,169,080
51552 :000,153,112,096,104,153,202
51558 :000,096,173,181,096,016,152
51564 :010,032,018,201,072,169,098
51570 :000,153,096,096,104,153,204
51576 :016,096,173,032,064,240,229
51582 :015,174,162,096,222,002,029
51588 :208,174,160,096,254,002,002
51594 :208,076,154,201,174,162,089
51600 :096,254,002,208,174,160,014
51606 :096,222,002,208,173,033,116
51612 :064,240,013,174,162,096,137
51618 :222,003,208,174,160,096,001
51624 :254,003,208,096,174,162,041
51630 :096,254,003,208,174,160,045
51636 :096,222,003,208,096,142,179
51642 :085,064,140,087,064,169,027
51648 :000,141,190,096,173,086,110
51654 :064,016,022,173,084,064,109
51660 :032,018,201,141,084,064,232
51666 :173,086,064,073,255,105,198
51672 :000,141,086,064,032,009,036
51678 :201,152,016,018,138,032,011
51684 :018,201,141,085,064,152,121
51690 :073,255,105,000,141,087,127
51696 :064,032,009,201,169,000,203
51702 :141,194,096,141,195,096,085
51708 :162,016,078,086,064,110,000
51714 :084,064,144,016,173,194,165
51720 :096,024,109,085,064,141,015
51726 :194,096,173,195,096,109,109
51732 :087,064,074,141,195,096,165
51738 :110,194,096,110,088,064,176
51744 :110,089,064,202,208,216,153
51750 :173,190,096,240,019,173,161
51756 :088,064,032,018,201,141,076
51762 :088,064,173,194,096,073,226
51768 :255,105,000,141,194,096,079
51774 :172,194,096,173,088,064,081
51780 :096,032,195,203,169,000,251
51786 :141,005,212,169,161,141,135
51792 :006,212,169,001,141,024,121
51798 :212,169,000,141,012,212,064
51804 :169,161,141,013,212,160,180
51810 :000,162,015,185,190,202,084
51816 :141,000,212,010,141,014,110
51822 :212,185,189,202,141,001,016
51828 :212,042,141,015,212,185,155
51834 :064,203,010,141,007,212,247
51840 :185,063,203,042,141,008,002
51846 :212,169,019,141,004,212,123
51852 :169,033,141,011,212,165,103
51858 :162,105,010,197,162,208,222
51864 :252,169,017,141,004,212,179
51870 :169,032,141,011,212,166,121
51876 :203,189,129,235,201,049,146
51882 :144,008,201,052,176,004,243
51888 :141,163,096,096,200,200,048
51894 :192,128,208,171,076,069,002
51900 :202,026,156,026,156,022,008
51906 :096,022,096,026,156,026,104
51912 :156,022,096,026,156,026,170
51918 :156,022,096,026,156,029,179
51924 :223,033,135,029,223,026,113
51930 :156,022,096,019,239,022,004
51936 :096,022,096,016,195,016,153
51942 :195,016,195,016,195,016,095

51948 :195,016,195,019,239,022,154
51954 :096,016,195,019,239,022,061
51960 :096,022,096,016,195,019,180
51966 :239,019,239,022,096,014,115
51972 :239,014,239,014,239,014,251
51978 :239,014,239,014,239,019,006
51984 :239,022,096,016,195,019,091
51990 :239,022,096,022,096,016,001
51996 :195,019,239,019,239,022,249
52002 :096,013,078,013,078,013,069
52008 :078,013,078,013,078,013,057
52014 :078,000,000,026,156,000,050
52020 :000,026,156,000,000,026,004
52026 :156,000,000,026,156,004,144
52032 :112,004,112,005,152,005,198
52038 :152,005,152,005,152,003,027
52044 :082,003,082,004,112,004,107
52050 :112,005,152,005,152,003,255
52056 :186,003,186,003,244,003,201
52062 :244,004,048,004,048,004,190
52068 :250,004,250,004,250,004,094
52074 :250,002,124,002,124,003,099
52080 :082,003,082,004,048,004,079
52086 :048,003,082,003,082,003,083
52092 :134,003,134,003,186,003,075
52098 :186,004,112,004,112,004,040
52104 :112,004,112,002,124,002,236
52110 :124,003,186,003,186,004,136
52116 :112,004,112,003,186,003,056
52122 :186,003,244,003,244,004,070
52128 :048,004,048,004,250,004,006
52134 :250,004,250,004,250,002,158
52140 :124,002,124,003,082,003,254
52146 :082,003,083,003,083,003,179
52152 :187,003,187,004,048,004,105
52158 :048,004,112,004,112,160,118
52164 :023,169,000,153,000,212,241
52170 :136,016,250,096,169,147,248
52176 :032,210,255,169,001,141,248
52182 :033,208,032,076,204,169,168
52188 :016,141,162,005,169,012,213
52194 :141,165,005,169,160,141,239
52200 :004,208,169,168,141,006,160
52206 :208,162,045,160,215,142,146
52212 :005,208,140,007,208,136,180
52218 :232,165,162,197,162,240,128
52224 :252,224,131,208,238,162,191
52230 :013,160,013,024,032,240,232
52236 :255,169,174,160,204,032,238
52242 :030,171,162,015,160,013,057
52248 :024,032,240,255,169,192,168
52254 :160,204,032,030,171,162,021
52260 :017,160,013,024,032,240,010
52266 :255,169,209,160,204,032,047
52272 :030,171,032,069,202,032,072
52278 :195,203,173,163,096,201,061
52284 :051,208,001,000,073,048,185
52290 :240,244,201,003,176,240,146
52296 :141,058,099,096,169,009,132
52302 :160,000,153,000,216,153,248
52308 :000,217,153,000,218,153,057
52314 :000,219,136,208,241,096,222
52320 :060,126,255,255,255,255,022
52326 :126,060,150,150,085,085,246
52332 :150,150,000,000,128,000,024
52338 :038,000,000,038,255,255,188
52344 :255,248,240,224,224,224,255
52350 :255,255,255,031,015,007,176
52356 :007,007,224,224,224,240,034

52362 :248,255,255,255,007,007,141
52368 :007,015,031,255,255,255,194
52374 :153,155,153,100,153,165,005
52380 :148,174,158,174,143,183,112
52386 :153,183,163,183,000,001,077
52392 :002,004,005,006,012,014,211
52398 :146,144,049,046,032,031,110
52404 :032,079,078,069,032,080,038
52410 :076,065,089,069,082,000,055
52416 :144,050,046,032,031,032,015
52422 :084,087,079,032,080,076,124
52428 :065,089,069,082,000,144,141
52434 :051,046,032,028,083,084,022
52440 :079,080,032,080,076,065,116
52446 :089,073,078,071,000,018,039
52452 :031,080,076,065,089,069,126
52458 :082,032,049,000,080,076,041
52464 :065,089,069,082,032,146,211
52470 :050,000,173,058,099,201,059
52476 :001,208,031,162,001,142,029
52482 :051,099,160,020,024,032,132
52488 :240,255,238,059,099,208,083
52494 :003,238,060,099,173,060,135
52500 :099,174,059,099,032,205,176
52506 :189,076,064,205,173,001,222
52512 :088,208,005,173,164,096,254
52518 :208,024,173,048,004,073,056
52524 :128,141,048,004,173,076,102
52530 :004,073,128,141,076,004,220
52536 :173,051,099,073,001,141,082
52542 :051,099,096,162,014,094,066
52548 :000,096,094,016,096,202,060
52554 :016,247,096,005,018,032,232
52560 :032,032,032,032,032,032,016
52566 :032,032,032,032,032,032,022
52572 :032,032,032,032,032,032,028
52578 :032,032,032,032,032,032,034
52584 :032,032,032,032,032,032,040
52590 :032,032,032,032,032,032,046
52596 :032,032,032,000,005,018,235
52602 :032,032,032,032,032,032,058
52608 :032,032,032,032,029,029,058
52614 :029,029,029,029,029,029,052
52620 :029,029,029,029,029,029,058
52626 :029,029,029,032,032,032,073
52632 :032,032,032,032,032,032,088
52638 :032,032,032,032,000,018,048
52644 :031,083,072,079,084,083,084
52650 :000,029,029,073,084,039,168
52656 :083,032,065,032,084,073,033
52662 :069,000,032,087,073,078,009
52668 :083,000,152,170,094,000,175
52674 :096,094,016,096,096,000,080
52680 :028,057,085,114,142,170,028
52686 :199,228,142,161,096,162,170
52692 :000,189,002,206,157,000,254
52698 :212,232,224,025,208,245,084
52704 :169,016,141,004,212,169,167
52710 :128,141,011,212,169,016,139
52716 :141,018,212,169,017,141,166
52722 :004,212,169,129,141,011,140
52728 :212,169,017,141,018,212,249
52734 :174,161,096,096,100,007,120
52740 :000,000,016,036,000,100,156
52746 :003,000,000,129,016,000,158
52752 :100,004,000,000,017,016,153
52758 :000,000,000,000,015,162,199
52764 :022,160,009,024,032,240,003
52770 :255,173,060,099,208,045,106

52776 :173,059,099,201,009,176,245
52782 :010,169,152,160,206,032,007
52788 :030,171,076,161,192,201,115
52794 :012,176,010,169,132,160,205
52800 :206,032,030,171,076,161,228
52806 :192,201,021,176,010,169,071
52812 :113,160,206,032,030,171,020
52818 :076,161,192,169,095,160,167
52824 :206,032,030,171,076,161,252
52830 :192,029,029,089,079,085,085
52836 :039,082,069,032,065,032,163
52842 :078,079,086,073,067,069,046
52848 :000,029,089,079,085,039,177
52854 :082,069,032,065,078,032,220
52860 :065,077,065,084,069,085,057
52866 :082,000,089,079,085,039,248
52872 :082,069,032,065,032,080,240
52878 :079,079,076,032,083,072,051
52884 :065,082,075,000,029,029,172
52890 :029,089,079,085,039,082,045
52896 :069,032,065,032,080,082,008
52902 :079,000,013,013,013,013,041

Astro-PANIC! For The VIC

(Article on page 58.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE's GAZETTE Programs," which appears before the Program Listings.

VIC MLX is required to enter this program.

4608 :162,000,189,074,003,201,117
4614 :094,144,003,076,106,019,192
4620 :234,234,234,234,189,070,183
4626 :003,016,021,010,133,174,119
4632 :056,189,068,003,229,174,231
4638 :157,068,003,176,020,222,164
4644 :066,003,076,055,018,234,232
4650 :010,024,125,068,003,157,173
4656 :068,003,144,003,254,066,074
4662 :003,134,174,234,189,066,086
4668 :003,201,001,144,007,201,105
4674 :166,176,059,076,192,018,241
4680 :032,148,224,166,174,165,213
4686 :141,157,070,003,169,127,233
4692 :157,071,003,165,143,048,159
4698 :024,234,234,234,165,142,099
4704 :041,128,029,071,003,157,013
4710 :071,003,094,070,003,169,000
4716 :001,157,066,003,076,192,091
4722 :018,094,070,003,094,071,208
4728 :003,076,091,018,234,234,008
4734 :234,234,032,148,224,166,140
4740 :174,165,141,157,070,003,074
4746 :169,127,157,071,003,165,062
4752 :143,048,029,169,128,094,243
4758 :070,003,029,070,003,157,226
4764 :070,003,165,142,041,128,193
4770 :029,071,003,157,071,003,240
4776 :169,166,157,066,003,076,037
4782 :192,018,094,070,003,094,133
4788 :071,003,076,147,018,234,217
4794 :234,234,234,234,234,234,054

4800 :189,071,003,016,021,010,246
4806 :133,174,056,189,069,003,054
4812 :229,174,157,069,003,176,244
4818 :020,222,067,003,076,231,061
4824 :018,234,010,024,125,069,184
4830 :003,157,069,003,144,003,089
4836 :254,067,003,134,174,234,070
4842 :189,067,003,201,003,144,073
4848 :007,201,150,176,059,076,141
4854 :106,019,032,148,224,166,173
4860 :174,165,141,157,071,003,195
4866 :169,127,157,070,003,165,181
4872 :143,048,024,234,234,234,157
4878 :165,142,041,128,029,070,077
4884 :003,157,070,003,094,071,162
4890 :003,169,003,157,067,003,172
4896 :076,106,019,094,071,003,145
4902 :094,070,003,076,014,019,058
4908 :234,234,234,234,032,148,136
4914 :224,166,174,165,141,157,053
4920 :071,003,169,127,157,070,141
4926 :003,165,143,048,029,169,107
4932 :128,094,071,003,029,071,208
4938 :003,157,071,003,165,142,103
4944 :041,128,029,070,003,157,252
4950 :070,003,169,150,157,067,190
4956 :003,076,106,019,094,071,205
4962 :003,094,070,003,076,067,155
4968 :019,234,024,138,105,012,124
4974 :041,252,170,224,083,176,032
4980 :003,076,002,018,076,234,013
4986 :019,234,234,234,162,000,237
4992 :032,238,025,189,067,003,170
4998 :074,074,074,168,185,000,197
5004 :027,157,072,003,185,032,104
5010 :027,157,073,003,189,066,149
5016 :003,074,074,074,024,125,014
5022 :072,003,157,072,003,144,097
5028 :003,254,073,003,024,138,147
5034 :105,012,041,252,170,224,206
5040 :083,176,003,076,128,019,149
5046 :234,076,000,020,234,234,212
5052 :234,234,234,234,189,064,097
5058 :003,133,176,189,065,003,251
5064 :133,177,169,032,160,000,103
5070 :145,176,200,145,176,160,184
5076 :022,145,176,200,145,176,052
5082 :076,016,020,189,074,003,084
5088 :201,094,144,220,134,178,171
5094 :076,016,020,234,238,192,238
5100 :003,173,192,003,205,193,237
5106 :003,176,003,076,000,018,006
5112 :169,000,141,192,003,076,061
5118 :126,019,032,208,025,162,058
5124 :000,142,063,003,234,234,168
5130 :234,234,234,076,221,019,004
5136 :189,074,003,201,000,208,179
5142 :100,173,063,003,010,010,125
5148 :010,010,010,133,179,024,138
5154 :189,067,003,041,007,101,186
5160 :179,133,179,105,008,133,009
5166 :177,134,178,189,066,003,025
5172 :041,006,010,010,010,170,043
5178 :164,179,189,032,029,153,036
5184 :000,028,189,040,029,153,247
5190 :016,028,232,200,196,177,151
5196 :208,238,238,063,003,024,082
5202 :165,178,105,012,041,252,067
5208 :170,224,083,144,176,162,023
5214 :000,189,074,003,201,000,049
5220 :240,009,201,088,176,005,051

5226 :169,144,141,169,003,138,102
5232 :024,105,012,170,224,083,218
5238 :144,231,076,128,020,076,025
5244 :000,023,234,234,162,000,009
5250 :142,063,003,134,178,189,071
5256 :072,003,133,176,189,073,014
5262 :003,133,177,173,063,003,182
5268 :010,010,133,187,160,000,136
5274 :177,176,133,188,032,000,092
5280 :021,160,022,177,176,133,081
5286 :188,230,187,032,000,021,056
5292 :160,001,177,176,133,188,239
5298 :230,187,032,000,021,160,040
5304 :023,177,176,133,188,230,087
5310 :187,032,000,021,166,178,006
5316 :138,024,105,012,170,238,115
5322 :063,003,224,083,144,181,132
5328 :173,141,002,201,000,240,197
5334 :008,169,001,141,194,003,218
5340 :076,208,020,169,000,141,066
5346 :194,003,234,169,014,141,213
5352 :015,144,173,169,003,141,109
5358 :013,144,169,007,141,248,192
5364 :151,076,160,022,234,234,097
5370 :234,234,234,234,234,234,118
5376 :132,189,165,187,010,010,181
5382 :010,170,105,008,133,190,110
5388 :165,188,201,031,176,019,024
5394 :010,010,010,168,189,000,149
5400 :028,025,000,028,157,000,006
5406 :028,232,200,228,190,208,092
5412 :241,164,189,166,178,189,139
5418 :074,003,201,094,144,001,047
5424 :096,165,187,145,176,096,145
5430 :234,234,234,234,234,234,178
5436 :234,234,234,234,173,160,049
5442 :003,201,001,240,074,169,242
5448 :001,141,160,003,173,060,098
5454 :003,141,162,003,160,000,035
5460 :162,060,041,007,201,003,046
5466 :144,007,160,001,162,061,113
5472 :234,234,234,140,166,003,083
5478 :142,161,003,173,060,003,132
5484 :074,074,074,024,105,184,131
5490 :141,164,003,169,031,141,251
5496 :165,003,169,160,141,163,153
5502 :003,234,173,060,003,041,128
5508 :007,024,109,162,003,141,066
5514 :162,003,169,240,141,012,097
5520 :144,076,045,024,234,234,133
5526 :234,234,234,234,234,234,018
5532 :234,234,234,234,173,160,145
5538 :003,201,001,208,073,162,042
5544 :000,189,066,003,056,233,203
5550 :004,205,162,003,176,044,000
5556 :105,012,205,162,003,144,043
5562 :037,173,163,003,024,105,179
5568 :008,221,067,003,144,026,149
5574 :173,163,003,056,233,015,073
5580 :221,067,003,176,015,189,107
5586 :074,003,201,000,208,008,192
5592 :076,160,023,234,234,234,153
5598 :234,234,138,024,105,012,201
5604 :170,224,083,144,192,234,251
5610 :234,234,234,234,234,234,102
5616 :096,234,234,234,234,234,226
5622 :234,234,234,234,234,234,114
5628 :234,234,234,234,234,234,120
5634 :234,234,234,234,234,234,126
5640 :234,234,234,234,234,234,132
5646 :234,234,173,160,003,201,251
5652 :001,208,105,172,166,003,163
5658 :173,164,003,133,251,173,155
5664 :165,003,133,252,169,032,018
5670 :145,251,056,173,164,003,062
5676 :233,022,176,003,206,165,081
5682 :003,141,164,003,056,173,078
5688 :163,003,233,008,141,163,255
5694 :003,201,160,144,011,169,238
5700 :000,141,160,003,141,013,014
5706 :144,076,191,234,173,164,032
5712 :003,133,251,173,165,003,040
5718 :133,252,172,166,003,173,217
5724 :161,003,133,254,032,160,067
5730 :021,165,254,145,251,173,083
5736 :160,003,201,001,208,008,173
5742 :173,012,144,233,007,141,052
5748 :012,144,234,234,234,234,184
5754 :234,234,234,234,234,234,246
5760 :173,005,144,201,253,208,088
5766 :005,169,255,141,005,144,085
5772 :169,014,173,160,003,201,092
5778 :001,240,005,169,096,141,030
5784 :012,144,076,191,234,234,019
5790 :234,234,162,004,189,068,025
5796 :027,024,125,074,027,201,130
5802 :010,144,008,254,073,027,174
5808 :233,010,076,169,022,157,075
5814 :074,027,169,000,157,068,165
5820 :027,189,074,027,024,105,122
5826 :176,157,234,031,202,224,194
5832 :255,208,215,162,003,160,179
5838 :128,136,192,255,208,251,096
5844 :202,224,255,208,244,173,238
5850 :195,003,024,105,176,141,094
5856 :249,031,173,193,003,201,050
5862 :010,160,176,144,004,200,156
5868 :056,233,010,140,245,031,183
5874 :024,105,176,141,246,031,197
5880 :076,128,026,234,234,234,156
5886 :234,234,254,074,003,254,027
5892 :074,003,234,234,234,189,204
5898 :074,003,041,240,201,096,153
5904 :144,005,076,058,023,234,044
5910 :234,134,178,032,044,023,155
5916 :010,010,010,010,010,133,211
5922 :179,189,067,003,041,007,008
5928 :076,069,023,234,024,105,059
5934 :032,133,253,234,234,234,142
5940 :173,063,003,096,234,234,087
5946 :169,096,157,074,003,141,186
5952 :169,003,076,023,023,024,126
5958 :101,179,133,179,105,008,007
5964 :133,177,169,000,141,169,097
5970 :003,166,253,076,058,020,146
5976 :234,234,234,234,234,234,212
5982 :234,234,162,000,169,000,125
5988 :157,082,027,169,048,157,228
5994 :250,027,232,224,005,208,028
6000 :241,238,096,026,169,014,128
6006 :141,015,144,162,060,169,041
6012 :000,157,000,003,232,224,228
6018 :248,144,248,056,076,051,185
6024 :025,234,234,234,234,234,051
6030 :234,234,173,194,003,201,157
6036 :001,240,003,076,000,024,236
6042 :141,012,144,076,191,234,184
6048 :169,032,133,254,169,016,165
6054 :157,074,003,169,000,141,198
6060 :160,003,141,012,144,157,021
6066 :070,003,157,071,003,169,139
6072 :144,141,013,144,238,170,010

6078 :003,189,067,003,074,074,088
6084 :024,105,006,201,010,144,174
6090 :008,233,010,238,071,027,021
6096 :076,199,023,109,072,027,202
6102 :141,072,027,076,224,021,007
6108 :234,234,234,234,234,234,088
6114 :234,234,234,234,234,234,094
6120 :234,234,234,234,234,234,100
6126 :234,234,234,234,234,234,106
6132 :234,234,234,234,234,234,112
6138 :234,234,234,234,234,234,118
6144 :173,060,003,074,074,074,202
6150 :170,169,127,141,034,145,024
6156 :173,031,145,041,016,208,114
6162 :006,206,060,003,206,060,047
6168 :003,173,032,145,041,128,034
6174 :208,006,238,060,003,238,015
6180 :060,003,173,031,145,041,233
6186 :032,240,027,173,060,003,065
6192 :201,000,208,005,169,002,121
6198 :141,060,003,173,060,003,238
6204 :201,166,208,005,169,164,205
6210 :141,060,003,076,192,024,050
6216 :076,064,021,234,234,234,167
6222 :234,234,173,060,003,041,055
6228 :006,170,160,015,185,016,124
6234 :029,153,224,028,136,192,084
6240 :255,208,245,234,234,234,226
6246 :224,000,240,038,160,015,011
6252 :185,224,028,074,153,224,228
6258 :028,144,008,185,232,028,227
6264 :009,128,153,232,028,136,038
6270 :192,255,208,234,202,076,013
6276 :102,024,234,234,234,234,170
6282 :234,234,234,234,234,234,006
6288 :173,060,003,074,074,074,090
6294 :170,169,028,157,184,031,121
6300 :234,234,169,029,157,185,140
6306 :031,169,255,141,034,145,169
6312 :234,234,234,234,234,234,036
6318 :173,060,003,141,061,003,103
6324 :201,254,208,005,169,000,249
6330 :141,060,003,076,000,022,232
6336 :173,060,003,205,061,003,185
6342 :240,200,173,061,003,074,181
6348 :074,074,170,169,032,157,112
6354 :184,031,157,185,031,076,106
6360 :080,024,234,234,234,076,074
6366 :229,026,169,144,141,020,183
6372 :003,169,023,141,021,003,076
6378 :169,159,141,014,144,169,006
6384 :255,141,005,144,162,000,179
6390 :169,000,157,068,027,232,131
6396 :224,014,208,248,169,003,094
6402 :141,195,003,169,147,032,177
6408 :210,255,169,000,141,193,208
6414 :003,169,080,141,060,003,214
6420 :162,000,169,003,157,000,255
6426 :151,169,012,157,228,150,125
6432 :157,000,150,232,224,000,027
6438 :208,238,173,096,026,201,212
6444 :000,208,003,076,096,023,194
6450 :024,176,168,234,162,000,046
6456 :189,096,027,157,228,031,016
6462 :232,224,022,208,245,096,065
6468 :234,234,162,000,189,082,201
6474 :027,221,074,027,240,005,156
6480 :176,030,076,095,025,232,202
6486 :224,005,208,238,076,112,181
6492 :025,162,000,189,074,027,057
6498 :157,082,027,024,105,048,029

6504 :157,250,027,232,224,005,231
6510 :208,239,162,000,169,000,120
6516 :189,128,027,032,210,255,189
6522 :232,224,128,208,245,096,231
6528 :162,000,160,002,152,157,249
6534 :067,003,169,000,141,013,015
6540 :144,157,074,003,157,075,238
6546 :003,138,157,066,003,024,025
6552 :105,012,170,224,083,144,122
6558 :229,096,162,000,169,029,075
6564 :133,177,169,234,133,176,162
6570 :165,176,024,105,022,133,027
6576 :176,144,002,230,177,157,038
6582 :255,026,165,177,157,031,225
6588 :027,232,224,031,144,232,054
6594 :032,224,024,169,000,141,016
6600 :160,003,032,128,025,076,112
6606 :000,018,162,000,138,157,169
6612 :000,028,157,032,028,157,102
6618 :064,028,157,096,028,157,236
6624 :128,028,157,160,028,157,114
6630 :192,028,232,224,032,144,058
6636 :230,096,189,072,003,157,215
6642 :064,003,189,073,003,157,219
6648 :065,003,096,234,234,234,090
6654 :234,234,173,170,003,201,245
6660 :007,176,003,076,074,026,110
6666 :162,000,169,032,157,000,018
6672 :030,157,000,031,232,224,178
6678 :000,208,245,169,000,141,017
6684 :192,003,024,173,193,003,104
6690 :105,001,041,015,141,193,018
6696 :003,169,000,141,192,003,036
6702 :141,170,003,141,169,003,161
6708 :032,128,025,032,054,025,092
6714 :076,000,018,000,255,255,150
6720 :255,255,255,250,255,152,206
6726 :255,085,255,255,165,203,008
6732 :201,064,208,003,076,000,116
6738 :018,076,160,025,020,254,123
6744 :255,000,087,255,085,084,086
6750 :000,191,000,000,000,255,028
6756 :000,255,000,255,255,016,113
6762 :170,255,084,085,136,067,135
6768 :190,255,000,255,000,255,043
6774 :000,000,064,255,000,255,180
6780 :000,000,255,255,162,000,028
6786 :189,067,003,201,148,144,114
6792 :022,189,066,003,024,105,033
6798 :003,205,061,003,144,011,057
6804 :056,233,007,205,061,003,201
6810 :176,003,076,173,026,138,234
6816 :024,105,012,170,224,083,010
6822 :144,218,076,000,026,234,096
6828 :234,206,193,003,169,007,216
6834 :141,170,003,206,195,003,128
6840 :173,195,003,201,000,240,228
6846 :038,169,001,141,194,003,224
6852 :141,013,144,160,255,162,047
6858 :001,140,012,144,140,015,142
6864 :144,202,224,001,208,251,214
6870 :136,192,064,208,238,169,197
6876 :000,141,194,003,076,000,122
6882 :026,234,234,169,000,141,006
6888 :014,144,141,169,003,141,076
6894 :192,003,238,194,003,032,132
6900 :070,025,165,203,201,064,204
6906 :240,250,076,160,025,234,211
6912 :234,234,234,234,234,234,124
6918 :234,234,234,234,234,234,130
6924 :234,234,234,234,234,234,136

6930 :234,234,234,234,234,234,142
 6936 :234,234,234,234,234,234,148
 6942 :234,234,234,234,234,234,154
 6948 :234,234,234,234,234,234,160
 6954 :234,234,234,234,234,234,166
 6960 :234,234,234,234,234,234,172
 6966 :234,234,234,234,234,234,178
 6972 :234,234,234,234,234,234,184
 6978 :234,234,234,234,234,234,190
 6984 :234,234,000,002,000,003,033
 6990 :002,234,000,000,000,002,060
 6996 :009,004,002,234,234,234,033
 7002 :234,234,234,234,234,234,214
 7008 :147,131,143,146,133,189,217
 7014 :176,176,176,176,176,176,160,118
 7020 :151,129,150,133,189,176,012
 7026 :176,160,033,176,032,032,211
 7032 :234,234,234,234,234,234,244
 7038 :234,234,005,018,065,032,202
 7044 :083,032,084,032,082,032,221
 7050 :079,032,045,032,080,032,182
 7056 :065,032,078,032,073,032,200
 7062 :067,013,032,032,032,018,088
 7068 :156,070,079,082,032,084,147
 7074 :072,069,032,086,073,067,049
 7080 :032,050,048,013,032,032,119
 7086 :158,032,032,032,032,032,236
 7092 :032,032,032,032,032,032,116
 7098 :032,032,032,032,032,032,122
 7104 :013,032,032,032,032,032,109
 7110 :159,018,032,032,032,032,247
 7116 :032,032,032,032,032,013,121
 7122 :032,018,030,032,032,080,178
 7128 :082,069,083,083,032,065,118
 7134 :078,089,032,075,069,089,142
 7140 :013,031,032,018,032,072,170
 7146 :073,071,072,032,083,067,120
 7152 :079,082,069,058,005,000,021
 7158 :000,000,000,000,048,048,086
 7164 :048,050,051,000,255,084,228
 7170 :000,255,255,255,255,000,254
 7176 :255,255,255,255,255,255,002
 7182 :255,250,255,255,255,212,216
 7188 :168,255,000,255,000,255,185
 7194 :000,255,255,251,017,000,036
 7200 :255,255,255,255,255,000,027
 7206 :255,255,255,191,246,255,215
 7212 :255,250,251,255,255,083,113
 7218 :255,166,000,252,255,255,209
 7224 :255,000,000,255,255,000,053
 7230 :255,255,168,255,000,000,227
 7236 :255,170,255,000,255,255,234
 7242 :162,004,255,255,255,255,236
 7248 :255,255,255,000,255,255,075
 7254 :255,255,255,255,255,255,080
 7260 :255,255,004,191,000,255,028
 7266 :255,255,255,255,255,255,092
 7272 :255,255,000,128,255,255,228
 7278 :255,255,191,085,255,255,126
 7284 :000,238,000,255,230,171,242
 7290 :255,255,168,255,255,255,029
 7296 :000,008,252,004,000,000,136
 7302 :255,000,255,000,255,187,062
 7308 :000,000,220,000,000,255,103
 7314 :255,020,008,020,000,000,193
 7320 :000,000,000,000,000,064,216
 7326 :000,000,020,000,084,255,005
 7332 :000,004,255,255,000,000,166
 7338 :000,000,000,136,000,000,050
 7344 :000,000,000,020,000,000,196
 7350 :000,000,000,020,000,000,202

7356 :000,064,000,000,000,000,252
 7362 :255,255,020,000,000,000,212
 7368 :129,000,255,255,068,255,138
 7374 :238,239,000,136,168,255,218
 7380 :255,000,000,000,132,255,086
 7386 :000,255,255,016,220,040,236
 7392 :000,000,000,255,000,084,051
 7398 :000,000,008,128,000,020,130
 7404 :034,000,000,085,000,000,099
 7410 :000,255,000,213,213,064,219
 7416 :000,008,255,255,213,000,211
 7422 :255,255,000,000,000,000,252
 7428 :000,000,000,000,000,008,012
 7434 :028,062,062,042,000,000,204
 7440 :012,012,063,063,251,217,122
 7446 :217,200,000,000,000,000,183
 7452 :192,192,192,192,012,063,103
 7458 :085,136,136,085,063,012,039
 7464 :000,000,064,128,128,064,168
 7470 :000,000,003,015,021,034,119
 7476 :034,021,015,003,000,192,061
 7482 :080,032,032,080,192,000,218
 7488 :000,003,005,008,008,005,093
 7494 :003,000,192,240,084,136,213
 7500 :136,084,240,192,000,000,216
 7506 :001,002,002,001,000,000,088
 7512 :048,252,085,034,034,085,114
 7518 :252,048,160,042,043,175,046
 7524 :047,171,042,008,160,168,184
 7530 :234,248,250,224,168,032,238
 7536 :130,034,042,175,043,010,034
 7542 :042,136,002,136,160,170,252
 7548 :232,170,168,034,032,002,250
 7554 :136,043,142,034,128,034,135
 7560 :130,008,136,176,130,032,236
 7566 :044,002,032,003,000,003,226
 7572 :162,000,048,008,032,000,142
 7578 :002,136,000,050,128,004,218
 7584 :000,000,000,000,000,000,160
 7590 :000,000,000,000,000,000,166
 7596 :000,000,000,000,000,000,172
 7602 :000,020,000,000,000,000,198
 7608 :000,004,000,000,000,064,252
 7614 :000,000,000,000,245,255,178
 7620 :004,000,000,000,129,000,073
 7626 :255,255,068,255,174,239,168
 7632 :000,000,004,255,253,000,208
 7638 :000,000,164,255,000,255,120
 7644 :255,016,149,032,002,001,163
 7650 :002,001,002,001,002,001,235
 7656 :192,128,192,128,192,128,168
 7662 :192,128,000,000,000,255,045
 7668 :000,213,213,064,000,000,222
 7674 :255,255,149,000,255,255,139

Apple Hunt

(Article on page 54.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Apple Hunt—Redefined Characters (VIC Version)

10 POKE55,152:POKE56,28:CLR :rem 67

```

20 FORI=1TO95:READA:X=X+A:NEXT:IFX<>12828
  THENPRINT"ERROR IN DATA STATEMENTS.":S
  TOP                                     :rem 69
30 RESTORE:FORI=828TO866:READA:POKEI,A:NE
  XT                                     :rem 70
40 DATA 173,5,144,41,3,10,10           :rem 73
50 DATA 105,16,133,254,169,128         :rem 197
60 DATA 133,252,169,0,133,251,133     :rem 78
70 DATA 253,168,162,2,177,251,145,253
                                          :rem 36
80 DATA 200,208,249,230,252,230,254
                                          :rem 179
90 DATA 202,208,242,96                  :rem 60
100 POKE36878,15:DIMN(16):FORI=1TO16:READ
  N(I):NEXT                              :rem 21
110 DATA135,163,175,195,207,209,215,225,2
  31,232,235,240,237,235,237,240
                                          :rem 217
120 POKE36879,25:PRINT"{CLR}"CHR$(142)CHR
  $(8)SPC(6)"{6 DOWN}{BLK}WELCOME TO"
                                          :rem 205
130 PRINTSPC(5)"{2 DOWN}{BLK}*{RED}A{CYN}
  P{PUR}P{GRN}L{BLU}E {YEL}H{BLK}U{RED}
  N{CYN}T{PUR}*":GOSUB600               :rem 241
140 PRINT"{BLU}{4 DOWN}{5 SPACES}{RVS}DO
  {SPACE}YOU NEED"SPC(10)"INSTRUCTIONS?
  "SPC(11){OFF}{Y OR N}"               :rem 95
150 GETY$:IFY$=""OR(Y$<>"Y"ANDY$<>"N")THE
  N150                                     :rem 97
160 Y=(Y$="Y"):PRINT"{CLR}":POKE36869,255
  :SYS828:GOSUB500:IFNOT Y THEN440
                                          :rem 184
170 PRINT"{CLR}":POKE36879,251          :rem 58
180 PRINTSPC(5)"{RVS}{PUR}YOU ARE:{OFF}
  {BLK}S":PRINTSPC(5)"{DOWN}{RVS}{PUR}M
  ONSTER:{OFF}{BLU}!":PRINTSPC(5)"
  {DOWN}{RVS}{PUR}APPLE:{OFF}{RED}V"
                                          :rem 88
190 PRINTSPC(5)"{DOWN}{RVS}{PUR}TREE:
  {GRN}{OFF}U":PRINTSPC(5)"{DOWN}{RVS}
  {PUR}RUBY:Z"                           :rem 145
200 PRINT"{2 DOWN}{RVS}{BLK}SCORING:"PRI
  NT"{DOWN}{RED}V{RVS}:50-500 POINTS":P
  RINT"{DOWN}{BLU}!{RVS}:1000 POINTS"
                                          :rem 154
210 PRINT"{DOWN}{PUR}{RVS}Z:3000 POINTS"
                                          :rem 215
220 GOSUB640                              :rem 174
230 PRINT"{CLR}{DOWN}{BLK}S {RVS}{BLU}MUS
  T GRAB 5 {RED}{OFF}V{RVS}{BLU}
  {7 SPACES}BEFORE THE TIME IS UP"
                                          :rem 241
240 PRINT"{BLK}{RVS}THE {BLU}{OFF}!{BLK}
  {RVS} EATS THE {RED}{OFF}V{RVS}{BLK}
  {SPACE}AND{2 SPACES}THE{GRN}{OFF} U
  {BLK}"                                   :rem 91
250 PRINT"{DOWN}{RVS}{BLK}EVERY WAVE THER
  E ARE{2 SPACES}MORE {OFF}{GRN}U{BLK}
                                          :rem 207
260 PRINT"{DOWN}{RVS}{BLU}USE THE JOYSTIC
  K TO{3 SPACES}MOVE -{OFF}{BLK}S{RVS}
  {BLU} IN 4 DIRECTIONS"                 :rem 40
270 GOSUB640                              :rem 179
280 PRINT"{CLR}{2 DOWN}{3 RIGHT}{BLK}S
  {RVS} {BLU}WILL LOSE IF HE"           :rem 18
290 PRINTSPC(4)"{DOWN}{RVS}HITS A {GRN}
  {OFF}U{RVS}{BLU} OR IS"               :rem 230
300 PRINTSPC(2)"{DOWN}{RVS}{BLU}TOUCHED B
  Y THE{OFF} !{BLK}"                    :rem 218
310 PRINT"{2 DOWN}{RVS}{RED}YOUR GAME IS
  {SPACE}OVER IF {BLK}{OFF}S{RVS}":PRIN
                                          :rem 184
TSPC(4)"{RVS}{RED}TAKES TOO LONG"
                                          :rem 74
320 GOSUB640                              :rem 175
330 PRINT"{CLR}{2 DOWN}{BLU}{RVS}EXTRA
  {OFF}{BLK}S{RVS}{BLU} & ZAP AFTER
  {3 SPACES}WAVES 5,10,15,20 & 25"
                                          :rem 239
340 PRINT"{2 DOWN}{BLU}{RVS}WHEN {OFF}
  {BLK}S{RVS}{BLU} IS RUNNING OUT OF TI
  ME, THE SCREEN{3 SPACES}WILL TURN
  {RED}RED"                               :rem 81
350 PRINT"{2 DOWN}{BLU}{RVS}THE FASTER
  {OFF}{BLK}S{RVS}{BLU} FINISHES A WAVE
  THE MORE BONUSPOINTS ARE AWARDED
                                          :rem 39
360 GOSUB640                              :rem 179
370 PRINT"{CLR}{2 DOWN}{RVS}{BLU}PRESSING
  THE JOYSTICK BUTTON RELEASES A ZAP"
                                          :rem 105
380 PRINT"{DOWN}{BLK}S {RVS}MAY ONLY FIRE
  A ZAP WHEN STATIONARY"                 :rem 45
390 PRINT"{DOWN}{RVS}{RED}A ZAP DESTROYS
  {SPACE}{OFF}{GRN}U{RED}{RVS}
  {6 SPACES}SURROUNDING IT IN 8
  {3 SPACES}DIRECTIONS AND RESETS TIME
                                          :rem 254
400 PRINT"{DOWN}{RVS}{BLK}USING A ZAP CHA
  SES THE";                               :rem 157
410 PRINT"{OFF}{BLU}!{BLK}{RVS} TO ANOTHE
  R PLACE IN THE FOREST OR MAKES
  {3 SPACES}THE {OFF}{BLU}! {BLK}{RVS}D
  ISAPPEAR"                              :rem 62
420 PRINT"{2 DOWN}{RIGHT}{RVS}HIT ANY KEY
  TO START"                              :rem 159
430 GETA$:IFA$=""THEN430                 :rem 81
440 PRINT"{CLR}":POKE36879,25:POKE36869,2
  40                                       :rem 68
450 PRINT"{BLK}{3 DOWN}FOR TAPE, PRESS PL
  AY"                                       :rem 45
460 PRINT"{2 DOWN}JUST A FEW MOMENTS
  {4 SPACES}WHILE I LOAD THE{6 SPACES}S
  ECOND PART"                             :rem 207
470 S$="LO"+CHR$(34)+"P2"+CHR$(34)+",1:"+
  CHR$(131)                               :rem 127
480 REM CHANGE 1 TO 8 IN PRIOR LINE IF YO
  U ARE USING A DISK DRIVE               :rem 77
490 FORI=1TOLEN(S$):POKE630+I,ASC(MID$(S$
  ,I)):NEXT:POKE198,I:END                 :rem 148
500 FORC=7320TO7327:READA:POKEC,A:NEXT
                                          :rem 103
510 DATA60,66,165,129,165,153,66,60
                                          :rem 245
520 FORC=7432TO7439:READA:POKEC,A:NEXT
                                          :rem 113
530 DATA195,34,20,156,126,29,8,119
                                          :rem 193
540 FORC=7328TO7335:READA:POKEC,A:NEXT
                                          :rem 114
550 DATA60,66,165,129,153,165,66,60
                                          :rem 249
560 FORC=7336TO7343:READA:POKEC,A:NEXT
                                          :rem 114
570 DATA0,28,62,127,127,62,8,8         :rem 248
580 FORC=7344TO7351:READA:POKEC,A:NEXT:RE
  TURN                                     :rem 140
590 DATA6,8,60,126,126,126,60,24      :rem 87
600 POKE36878,15:FORO=0TO8:FORL=1+OTO8+O:
  N=N(L)                                   :rem 121
610 POKE36876,N:FORT=1TO50:NEXT:NEXT:NEXT
  :FORV=15TO0STEP-1:POKE36878,V:FORT=1T
  O300:NEXT                               :rem 184

```



```

620 POKE36878,0:POKE36876,0      :rem 6
630 RETURN                          :rem 121
640 PRINT"{2 DOWN}{BLK}{RVS}{5 RIGHT}HIT
      {SPACE}ANY KEY"              :rem 118
650 GETA$:IFA$=""THEN650          :rem 89
660 RETURN                          :rem 124

```

Program 2: Apple Hunt—Main Game (VIC Version)

```

2 S1=36874:S2=S1+1:S3=S2+1:V=S3+2:TP=3687
  9                                :rem 149
4 GOSUB110:B%=0:SO=0:TX=0:X=RND(0):rem 36
6 PRINT"{CLR}":POKE36869,255:SC=7680:Q=30
  720:ZZ=25:W=1:ME=2:POKEV,15:ZA=2:POKE37
  154,127                          :rem 21
8 POKETP,251:NO=127:FORL=1TOZZ:X=INT(RND(
  1)*506)                          :rem 229
10 NO=NO+1:POKES2,NO:IFNO=>254THENNO=127
  :rem 10
12 POKESC+Q+X,5:POKESC+X,21:POKES2,0:NEXT
  :ZZ=ZZ+15:TR=INT(RND(1)*4)+6     :rem 74
14 FORP=1TOTR:POKES3,240:TA=INT(RND(1)*50
  6)+SC:POKETA,22:POKETA+Q,2      :rem 158
16 IFINT(RND(1)*100)+1<=3THENPOKETA,218:P
  OKETA+Q,4                          :rem 239
18 POKES3,0:NEXT:SX=INT(RND(1)*506)+SC:PO
  KESX,33:POKESX+Q,6               :rem 213
20 PO=INT(RND(1)*506)+SC:IFPO=SXTHEN20
  :rem 71
22 POKEPO,19:POKEPO+Q,0:FORL=1TO3:POKEPO,
  19:FORP=1TO100:POKES2,200:NEXT :rem 47
24 POKEPO,32:FORP=1TO100:POKES2,0:NEXT:NE
  XT:POKEPO,19                      :rem 178
26 TI$="000000"                    :rem 202
28 IFTI=>786THENPOKETP,154:IFTI=>966THEN6
  2                                  :rem 155
30 POKES3,0:J=(PEEK(37137)AND28)OR(PEEK(3
  7152)AND128)                      :rem 22
32 ONABS((J-100)/4)-7GOTO50,50,34,,36,38,
  124,,,,40,50,50                  :rem 92
34 DR=-1:NO=165:GOTO42              :rem 33
36 DR=22:NO=189:GOTO42             :rem 47
38 DR=-22:NO=210:GOTO42           :rem 79
40 DR=1:NO=225                      :rem 21
42 POKES2,NO:PO=PO+DR:IFPO>8187THENPO=PO-
  506:POKEPO-DR+506,32             :rem 107
44 IFPO<7680THENPO=PO+506:POKEPO-DR-506,3
  2                                  :rem 59
46 IFPEEK(PO)<>32THEN64             :rem 134
48 POKEPO-DR,32:POKEPO,19:POKEPO+Q,0:POKE
  S2,0                                :rem 86
50 POKES1,128:POKESX,32:X=INT(RND(1)*8)+1
  :rem 179
52 JJ=(X=2)*22-(X=1)*22-(X=3)+(X=4)+(X=5)
  *23-(X=6)*23+(X=7)*21-(X=8)*21:rem 149
54 SX=SX+JJ:IFSX<7680THENSX=SX+506:POKESX
  -JJ,32                             :rem 46
56 IFSX>8187THENSX=SX-506:POKESX-JJ,32
  :rem 171
58 IFPEEK(SX)=19THENPOKESX-JJ,33:POKESX+Q
  -JJ,6:POKEPO,20:POKEPO+Q,0:GOTO78
  :rem 43
60 POKESX,33:POKESX+Q,6:POKES1,0:GOTO28
  :rem 234
62 PRINT"{2 DOWN}{RVS}{BLK}TOOK TOO LONG"
  :POKEPO,20:POKEPO+Q,0:GOTO82 :rem 175
64 IFPEEK(PO)=21ORPEEK(PO)=33THENPOKEPO-D
  R,20:POKEPO+Q-DR,0:GOTO78       :rem 218
66 IFPEEK(PO)<>22THEN72            :rem 134
68 POKEPO-DR,32:POKEPO,19:POKEPO+Q,0:SO=S
  O+INT(RND(1)*10+1)*50:POKES3,230+B%:TX

```

```

=TX+1                                :rem 121
70 IFTX>4THEN94                      :rem 176
72 IF PEEK(PO)<>218THENB%=B%+2:GOTO48
  :rem 152
74 POKEPO-DR,32:POKEPO,19:POKEPO+Q,0
  :rem 11
76 PRINT"{HOME}{RVS}{2 RIGHT}{BLK}3000 PO
  INTS!":SO=SO+3000:A1%=1:POKES3,250:GOT
  O94                                :rem 104
78 POKES1,0:POKES3,0:FORP=0TO53:POKES2,18
  0-P:FORL=1TO20:NEXT:NEXT         :rem 180
80 ME=ME-1:IFME=>1THENZZ=ZZ-15:PRINT"
  {CLR}":GOTO8                      :rem 222
82 PRINT"{HOME}{RVS}{4 DOWN}{BLK}":FORP=1
  TO10:PRINT"{RVS}{BLK}GAME OVER":POKES1
  ,128:FORL=1TO100:NEXT           :rem 86
84 PRINT"{UP} {UP}":POKES1,0:FOR
  L=1TO100:NEXT:NEXT:IFSO>HSTHENHS=SO
  :rem 150
86 POKE36869,240:POKE198,0:PRINT"{CLR}
  {BLK}{2 DOWN}SCORE="SO:PRINT"{DOWN}WAV
  E"W:PRINT"{DOWN}{BLK}AGAIN(Y OR N)"
  :rem 204
88 GETC$:IFC$="N"THENPOKE37139,128:POKE37
  154,255:END                      :rem 40
90 IFC$="Y"THEN4                     :rem 156
92 GOTO88                            :rem 20
94 BO=INT(966-TI)*3:IFPEEK(TP)=154THENBO=
  0                                  :rem 42
96 PRINT"{HOME}{3 DOWN}{RVS}{BLK}WAVE";W;
  "OVER":TX=0:IFW=5ORW=10ORW=15ORW=20ORW
  =25THEN118                        :rem 186
98 W=W+1:PRINT"{RVS}{DOWN}BONUS="BO:SO=SO
  +BO:PRINT"{RVS}{DOWN}SCORE="SO :rem 59
100 PRINT"{RVS}{DOWN}MEN=";ME:POKES1,0:PO
  KES2,0:POKES3,0:POKES3+1,0:PRINT"
  {RVS}{DOWN}ZAPS="ZA:B%=0        :rem 70
102 READN,D:IFN=-1THENPOKES2+A1%,0:A1%=0:
  GOTO108                            :rem 106
104 POKES2+A1%,N:FORP=1TOD:NEXT:GOTO102
  :rem 202
106 DATA200,180,0,5,210,180,0,5,220,200,0
  ,5,230,300,0,5,220,120,0,5,230,450,-1
  ,-1                                :rem 84
108 FORP=1TO2500:NEXT:PRINT"{CLR}":RESTOR
  E:GOTO8                             :rem 200
110 POKETP,30:PRINT"{CLR}{3 DOWN}{RED}"SP
  C(6)"APPLE HUNT{3 DOWN}":PRINT"
  {3 DOWN}{3 RIGHT}{BLK}HIGH SCORE="HS
  :rem 15
112 PRINT"{4 DOWN}{RIGHT}{PUR}{RVS}HIT AN
  Y KEY TO START"                  :rem 91
114 GETA$:IFA$=""THEN114           :rem 79
116 RETURN                            :rem 120
118 POKES2,0:FORP=1TO10:PRINT"{HOME}{RVS}
  EXTRA MAN & ZAP":POKES3,240:FORL=1TO1
  00:NEXT                            :rem 103
120 PRINT"{UP} "":POKES3,0:F
  ORL=1TO100:NEXT:NEXT:PRINT"{2 DOWN}"
  :rem 110
122 ME=ME+1:ZA=ZA+1:GOTO98         :rem 63
124 B=PEEK(37137)AND32:IFB<>0THEN50
  :rem 18
126 IFZA=<0THEN50                   :rem 0
128 ZA=ZA-1:POKETP,203              :rem 58
130 POKEPO+1,192:POKEPO-1,192:POKEPO-22,2
  21:POKEPO+22,221                 :rem 102
132 POKEPO+21,206:POKEPO-21,206:POKEPO-23
  ,205:POKEPO+23,205               :rem 202
134 POKEPO+1+Q,0:POKEPO-1+Q,1:POKEPO-22+Q
  ,2:POKEPO+22+Q,3                 :rem 190

```

```

136 POKEPO+21+Q,4:POKEPO-21+Q,5:POKEPO-23
+Q,6:POKEPO+23+Q,7 :rem 54
138 FORL=1TO100:POKES3+1,150:NEXT:POKES3+
1,0 :rem 158
140 IFPEEK(SX)<>33THENS0=SO+1000:POKES3,2
40:PRINT"{HOME}{RVS}{BLK}1000 POINTS!
":GOTO94 :rem 209
142 POKESX,32:SX=SC+INT(RND(1)*506)+1:POK
EPO+1,32:POKEPO-1,32:POKEPO-22,32:POK
EPO+22,32 :rem 230
144 POKEPO+21,32:POKEPO-21,32:POKEPO-23,3
2:POKEPO+23,32:POKETP,251:TI$="000000
":GOTO50 :rem 72

```

Program 3: Apple Hunt—64 Version

```

100 POKE56,48:CLR:TP=53280 :rem 251
110 FORI=1TO162:READA:X=X+A:NEXT :rem 15
120 IFX<>90689THENPRINT"{CLR}{BLK}ERROR I
N DATA STATEMENTS.":STOP :rem 24
130 RESTORE:POKETP,12:POKETP+1,12:PRINT"
{CLR}{WHT}{9 DOWN}"TAB(15)"WELCOME TO
" :rem 9
140 PRINTTAB(14)"{4 DOWN}{BLK}*{RED}APPLE
{BLU}HUNT{BLK}":GOSUB1300:GOSUB370
:rem 105
150 PRINT"{BLK}{4 DOWN}"TAB(6)"{RVS}NEED
{SPACE}INSTRUCTIONS (Y OR N) ?"
:rem 152
160 GETZ$:IFZ$="OR(Z$<>"Y"ANDZ$<>"N")THE
N160 :rem 103
170 IFZ$="N"THEN440 :rem 59
180 POKETP,1:POKETP+1,1 :rem 143
190 A$="{CLR}{BLK}{4 DOWN}":PRINTA$
{2 SPACES}YOU ARE %. THE OBJECT OF TH
E GAME IS{DOWN}" :rem 84
200 PRINT"TO EAT ALL THE APPLES({RED}&
{BLK})" :rem 130
210 PRINTTAB(25)"{UP}IN THE FOREST.
{DOWN}YOU(%) MUST AVOID THE TREES(
{GRN}[[{BLK}) AND THE" :rem 175
220 PRINT"{DOWN}MONSTER({BLU}!{BLK}). USE
YOUR JOYSTICK TO MOVE % {DOWN}THROUG
H THE FOREST." :rem 172
230 PRINTTAB(20)"{UP}% HAS LIMITED TIME
{2 SPACES}{DOWN}TO EAT ALL {RED}&
{BLK}. THE SCREEN WILL TURN";:rem 125
240 PRINT" RED":PRINT"{DOWN}IF % IS ABOUT
TO RUN OUT OF TIME.":GOSUB1310
:rem 42
250 PRINTA$[WHT]{3 SPACES}{BLU}!{BLK} WI
LL EAT {GRN}[[{BLK} AS WELL AS {RED}&
{BLK}. "; :rem 84
260 PRINT"IF % HITS {DOWN}{BLU}!{BLK} OR
{SPACE}{GRN}[[{BLK} YOU WILL LOSE."
:rem 118
270 PRINTTAB(21)"{UP} PRESS THE FIRE
{4 SPACES}{DOWN}BUTTON TO RELEASE A Z
AP. A ZAP DESTROYS" :rem 174
280 PRINT"{DOWN}{GRN}[[{BLK} AND RESETS TI
ME. IF {BLU}!{BLK} IS HIT BY A ZAP "
:rem 50
290 PRINT"YOU WILL BE AWARDED 1000":PRINT
TAB(25)"{UP}POINTS. "; :rem 82
300 PRINT"{BLU}!{BLK} WILL {DOWN}HOVER AR
OUND {RED}&{BLK} UNTIL % EATS IT OR
{BLU}!{BLK} GETS{DOWN}IT.":GOSUB1310
:rem 22
310 PRINTA$[3 SPACES]SOMETIMES A RUBY (
{PUR}#{BLK}) APPEARS ON THE{2 SPACES}
{DOWN}SCREEN, YOU MUST TRY ";:rem 170
320 PRINT"TO GET {PUR}#{BLK} BEFORE {BLU}

```

```

1{BLK}":PRINT"{DOWN}GETS IT. YOU CAN
{SPACE}GAIN 3000 POINTS FOR" :rem 74
330 PRINT"{DOWN}GETTING {PUR}#{BLK}. FOR
{SPACE}EACH {RED}&{BLK} YOU CAN SCORE
" :rem 28
340 PRINT"{DOWN}BETWEEN 50 TO 500 POINTS.
" :rem 43
350 PRINTTAB(26)"{UP}AN EXTRA % AND{DOWN}
ZAP ARE AWARDED AFTER WAVES 5,10,15,2
0{DOWN}" :rem 76
360 PRINT"AND 25.":GOSUB1310:PRINT"{CLR}"
:GOTO440 :rem 250
370 POKE53272,28:SYS828 :rem 61
380 READV:IFV=-1THEN400 :rem 138
390 FORI=VTOV+7:READA:POKEI,A:NEXT:GOTO38
0 :rem 247
400 S=54272:FORL=STOS+24:POKEL,0:NEXT
:rem 54
410 HF=S+1:DIMN(16):FORI=1TO16:READN(I):N
EXT:GOSUB1340 :rem 68
420 FORT=0TO8:READDR(T):NEXT :rem 35
430 RETURN :rem 119
440 PRINT"{CLR}":SO=0:TX=0:SC=1024:ZZ=45:
W=1:ME=2:ZA=2 :rem 126
450 DEFFND(Z)=ABS((JV=2)*1+(JV=1)*2+(JV=8
)*3+(JV=4)*4) :rem 201
460 POKETP,1:POKETP+1,1:FORL=1TOZZ:X=INT(
RND(0)*960):POKESC+S+X,5:POKESC+X,27
:rem 115
470 POKES+24,15:POKES+4,17:POKEHF,50:POKE
S,100:POKES+4,16:NEXT:ZZ=ZZ+27
:rem 138
480 TR=INT(RND(1)*6)+6:FORP=1TOTR:TA=INT(
RND(1)*960)+SC :rem 66
490 POKES+4,65:POKEHF,15:POKES+3,15:POKES
+2,20:POKES+4,64:POKETA,38:POKETA+S,2
:rem 17
500 IFINT(RND(1)*100)+1<=3THENPOKETA,35:P
OKETA+S,4 :rem 236
510 POKES+4,17:POKEHF,50:POKES,200:POKES+
4,16:NEXT :rem 52
520 SX=INT(RND(1)*960)+SC:POKESX,33:POKES
X+S,6 :rem 69
530 PO=INT(RND(1)*960)+SC:POKEPO,37:POKEP
O+S,0 :rem 32
540 FORL=1TO3:POKEPO,37:FORP=1TO100:NEXT
:rem 58
550 POKEPO,32:FORP=1TO100:NEXT:NEXT:POKEP
O,37 :rem 156
560 TI$="000000" :rem 253
570 IFTI=>1100THENPOKETP,2:IFTI=>1400THEN
710 :rem 210
580 JV=PEEK(56320):FR=JVAND16:JV=15-(JVAN
D15):IFFR=0THEN970 :rem 74
590 XX=FND(Z):IFXX=0THEN650 :rem 190
600 DR=DR(XX):PO=PO+DR:IFPO>2023THENPO=PO
-960:POKEPO-DR+960,32 :rem 127
610 IFPO<1024THENPO=PO+960:POKEPO-DR-960,
32 :rem 100
620 IFPEEK(PO)<>32THEN720 :rem 227
630 POKES+4,65:POKEHF,15:POKEPO-DR,32:POK
EPO,37:POKEPO+S,0:POKES+3,15 :rem 34
640 POKES+2,20:POKES+4,64 :rem 184
650 POKESX,32:X=INT(RND(1)*8)+1 :rem 53
660 JJ=DR(X) :rem 172
670 SX=SX+JJ:IFSX<1024THENSX=SX+960:POKES
X-JJ,32 :rem 88
680 IFSX>2023THENSX=SX-960:POKESX-JJ,32
:rem 209
690 IFPEEK(SX)=37THENPOKESX-JJ,33:POKESX+
S-JJ,6:POKEPO,29:POKEPO+S,0:GOTO790
:rem 155

```

```

700 POKESX,33:POKESX+S,6:GOTO570      :rem 6
710 PRINT"{2 DOWN}{BLK}TOOK TOO LONG":POK
EPO,29:POKEPO+S,0:GOTO800      :rem 6
720 IFPEEK(PO)=27ORPEEK(PO)=33THENPOKEPO-
DR,29:POKEPO+S-DR,0:GOTO790    :rem 75
730 IFPEEK(PO)<>38THEN760            :rem 239
740 POKEPO-DR,32:POKEPO,37:POKEPO+S,0:SO=
SO+INT(RND(1)*10+1)*50:TX=TX+1
                                :rem 102
750 GOSUB1440:IFTX>4THEN890      :rem 156
760 IFPEEK(PO)<>35THEN630          :rem 235
770 POKEPO-DR,32:POKEPO,37:POKEPO+S,0
                                :rem 64
780 PRINT"{HOME}{2 RIGHT}{BLK}3000 POINTS
.":SO=SO+3000:GOTO890          :rem 216
790 GOSUB1390:ME=ME-1:IFME=>1THENZZ=ZZ-27
:PRINT"{CLR}":GOTO460          :rem 2
800 PRINT"{HOME}{4 DOWN}{BLK}":FORP=1TO10
                                :rem 51
810 PRINT"{BLK}GAME OVER":FORL=1TO100:NEX
T                                :rem 216
820 PRINT"{UP}{13 SPACES}{UP}":FORL=1TO10
0:NEXT:NEXT:IFSO>HSTHENHS=SO :rem 123
830 POKETP,1:POKETP+1,1:PRINT"{CLR}"TAB(1
2)"{BLK}{7 DOWN}SCORE="SO:PRINTTAB(12
)"{DOWN}WAVE="W                :rem 206
840 PRINTTAB(12)"{DOWN}HIGH SCORE="HS
                                :rem 125
850 PRINTTAB(8)"{3 DOWN}{BLK}WISH TO PLAY
AGAIN(Y/N)?:POKE198,0          :rem 210
860 GETZ$:IFZ$="OR(Z$<>"Y"ANDZ$<>"N")THE
N860                             :rem 117
870 IFZ$="Y"THENPRINT"{CLR}":GOTO440
                                :rem 36
880 POKE53272,21:END            :rem 114
890 BO=INT(1400-TI)*3:IF(PEEK(TP)AND15)=2
THENBO=0                          :rem 160
900 PRINT"{HOME}{3 DOWN}{BLK}WAVE";W;"OVE
R":TX=0:TR=0:IFW=5ORW=10ORW=15ORW=20O
RW=25THEN940                    :rem 34
910 W=W+1:PRINT"{DOWN}BONUS="BO:SO=SO+BO:
PRINT"{DOWN}SCORE="SO          :rem 64
920 PRINT"{DOWN}MEN=";ME:PRINT"{DOWN}ZAPS
=";ZA                              :rem 212
930 GOSUB1340:PRINT"{CLR}":GOTO460
                                :rem 143
940 FORP=1TO10:PRINT"{HOME}EXTRA MAN AND
{SPACE}ZAP":FORL=1TO100:NEXT :rem 10
950 PRINT"{UP}{17 SPACES}":FORL=1TO100:NE
XT:NEXT:PRINT"{2 DOWN}"        :rem 46
960 ME=ME+1:ZA=ZA+1:GOTO910     :rem 114
970 IFZA=<0THEN650              :rem 61
980 ZA=ZA-1:POKETP+1,4:POKETP,3 :rem 167
990 POKEPO+1,64:POKEPO-1,64:POKEPO-40,93:
POKEPO+40,93                    :rem 190
1000 POKEPO+39,78:POKEPO-39,78:POKEPO-41,
77:POKEPO+41,77                :rem 99
1010 POKEPO+1+S,0:POKEPO-1+S,2:POKEPO-40+
S,3:POKEPO+40+S,4              :rem 243
1020 POKEPO+39+S,5:POKEPO-39+S,6:POKEPO-4
1+S,7:POKEPO+41+S,8            :rem 125
1030 FORL=1TO100:NEXT           :rem 18
1040 IFPEEK(SX)<>33THENS0=SO+1000:PRINT"
{HOME}{BLK}1000 POINTS.":GOTO890
                                :rem 127
1050 POKESX,32:SX=SC+INT(RND(1)*960)+1:PO
KEPO+1,32:POKEPO-1,32          :rem 199
1060 POKEPO-40,32:POKEPO+40,32  :rem 223
1070 POKEPO+39,32:POKEPO-39,32:POKEPO-41,
32:POKEPO+41,32                :rem 68
1080 POKETP,1:POKETP+1,1:TI$="000000":GOT
                                :rem 105
0650                             :rem 105
1090 DATA 173,14,220,41,254,141,14
                                :rem 123
1100 DATA 220,173,24,208,41,14,10 :rem 62
1110 DATA 10,133,167,169,208,133,252
                                :rem 229
1120 DATA 173,0,221,41,3,73,3  :rem 123
1130 DATA 10,10,10,10,10,10,5  :rem 98
1140 DATA 167,133,254,165,1,41,251
                                :rem 130
1150 DATA 133,1,169,0,133,251,133 :rem 71
1160 DATA 253,168,162,8,177,251,145
                                :rem 197
1170 DATA 253,200,208,249,230,252,230
                                :rem 19
1180 DATA 254,202,208,242,165,1,9 :rem 83
1190 DATA 4,133,1,173,14,220,9  :rem 182
1200 DATA 1,141,14,220,96       :rem 188
1210 DATA12584,60,66,165,129,165,153,66,6
0                                :rem 83
1220 DATA12552,195,34,20,156,126,29,8,119
                                :rem 25
1230 DATA12520,60,66,165,129,153,165,66,6
0                                :rem 75
1240 DATA12504,0,28,62,127,127,62,8,8
                                :rem 75
1250 DATA12592,6,8,60,126,126,126,60,24
                                :rem 176
1260 DATA12568,60,126,255,255,126,60,24,8
,-1                              :rem 167
1270 DATA35,40,45,50,55,60,65,70,75,80,85
,90,95,100,105,110             :rem 133
1280 REM DATA35,63,75,95,107,109,115,125,
131,132,135,140,137,135,137,140
                                :rem 38
1290 DATA0,40,-40,1,-1,-41,41,-39,39
                                :rem 246
1300 AD=828:FORI=ADTOAD+81:READA:POKEI,A:
NEXTI:RETURN                    :rem 162
1310 PRINTTAB(14)"{2 DOWN}{RVS}HIT ANY KE
Y{OFF}"                          :rem 159
1320 GETZ$:IFZ$=" "THEN1320      :rem 225
1330 RETURN                      :rem 167
1340 POKES+24,15:POKES+5,90:POKES+6,240
                                :rem 253
1350 POKES+4,17:FORO=0TO3        :rem 241
1360 FORL=1+OTO8+O:POKEHF,N(L)   :rem 72
1370 POKES,110:FORT=1TO50:NEXT:NEXT:NEXT:
FORV=15TO0STEP-1:POKES+24,V :rem 183
1380 FORI=1TO50:NEXT:NEXT:POKES+4,16:RETU
RN                                :rem 44
1390 POKES+24,15:POKES+5,90:POKES+6,240
                                :rem 2
1400 POKES+4,17                 :rem 58
1410 FORL=50TO5STEP-5:POKEHF,L  :rem 128
1420 POKES,5:FORT=1TO50:NEXT:NEXT:FORV=15
TO0STEP-1:POKES+24,V          :rem 221
1430 FORI=1TO50:NEXT:NEXT:POKES+4,16:RETU
RN                                :rem 40
1440 POKES+24,15:POKES+4,65:POKES+3,15:PO
KES+2,20:FORI=1TO250STEP5     :rem 246
1450 POKEHF,I:NEXT:POKES+4,64:RETURN
                                :rem 64

```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Number Quest

(Article on page 67.)

Program 1: Number Quest—64 Version

```

10 PRINT "{CLR}{10 RIGHT}{12 DOWN}"; "JUST
   {SPACE}A MOMENT..." :rem 19
20 POKE56,48:CLR:K=12288:PC=56334:CP=5327
   2 :rem 146
30 IF PEEK(12288)+PEEK(12289)=162THEN60 :rem 127
40 POKEPC,PEEK(PC)AND254:POKE1,PEEK(1)AND
   251 :rem 161
50 FORJ=0TO4095:POKEK+J,PEEK(53248+J):NEX
   TJ :rem 129
60 FORI=216TO255:READA%:POKEK+I,A%:NEXTI:
   FORI=280TO295:READA%:POKEK+I,A%:NEXTI
   :rem 159
70 POKE1,PEEK(1)OR4:POKEPC,PEEK(PC)OR1
   :rem 114
80 POKECP,21:BC=53280:BK=53281:POKEBC,2:P
   OKEBK,1:PRINT "{CLR}" :rem 251
90 PRINTSPC(90)"{BLK}{2 SPACES}{M}M{2 G}
   {2 M}M{G}O{G}O O{G}" :rem 109
100 PRINT "{12 SPACES}{M} {G}L@{M}
   {2 SPACES}{G}O{G}O O{G}" :rem 55
110 PRINTTAB(21)"{T} {T}" :rem 52
120 PRINT:PRINT "{RED}{13 SPACES}OP {G}M}
   O O PO" :rem 111
130 PRINT "{13 SPACES}L@{F}L@ O P {M}G}"
   :rem 23
140 PRINTTAB(19)"{T} {T}" :rem 62
150 PRINTSPC(131)"{BLU}PRESS THE F1 KEY"
   :rem 32
160 V=54272:FORSL=VTOV+24:POKESL,0:NEXT
   :rem 232
170 POKEV+5,88:POKEV+4,33:POKEV+24,143:PO
   KEV+6,195 :rem 200
180 READLF,HF,DR:IFLF=-1THEN200 :rem 122
190 POKEV,LF:POKEV+1,HF:FORT=1TODR:NEXTT:
   GOTOL80 :rem 167
200 POKEV,0:POKEV+1,0:POKEV+24,0 :rem 150
210 GETA$:IFA$=""THEN210 :rem 73
220 IFA$=CHR$(133)THEN240 :rem 115
230 GOTOL0 :rem 97
240 PRINT "{CLR}":POKEBC,7:POKEBK,15
   :rem 211
250 PRINTSPC(211)"{BLK}YOU HAVE {RED}5
   {BLK}TURNS":PRINTSPC(51)"TO GUESS A N
   UMBER" :rem 61
260 PRINTSPC(51)"{BLK}FROM {RED}10 {BLK}T
   O {RED}100":PRINTSPC(211)"{BLU}PRESS
   {SPACE}THE F1 KEY" :rem 234
270 GETA$:IFA$=""THEN270 :rem 85
280 IFA$=CHR$(133)THEN300 :rem 118
290 GOTOL0 :rem 109
300 PRINT "{CLR}":POKEBC,6:POKEBK,1:TN=1:P
   OKECP,(PEEK(CP)AND240)+12 :rem 93
310 PRINTSPC(92)"{BLU}GUESS THE NUMBER"
   :rem 87
320 PRINT:PRINTTAB(24)"{BLK}{£":PRINT "
   {12 DOWN}":PRINTTAB(19)"{BLK}"
   :rem 99
330 PRINT "{BLK}]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]
   {BLU}↑↑↑↑{BLK}]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]
   ]]]]]]]]]": :rem 177
340 FOR T= 1TO2 :rem 21
350 PRINT "{BLK}]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]
   ]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]

```

```

239:FORT=1TO50:NEXTT           :rem 115
770 POKEBL,PEEK(BL)OR16:FORT=1TO40:NEXTT:
NEXTN:RETURN                   :rem 43
780 GOSUB760:P=5:GOSUB710:FORN=1TO7
                                :rem 193
790 POKEX,32:POKEX+40,32       :rem 153
800 POKEX+39,31:POKECX+39,2:POKEX+79,35:P
OKECX+79,0:X=X+39:CX=CX+39:NEXTN
                                :rem 243
810 POKEV+24,143:FORM=30TO60:POKEV,INT(M/
2):POKEV+1,M:FORT=1TO10:NEXTT:NEXTM
                                :rem 109
820 POKEV+24,0:POKEV,0:POKEV+1,0 :rem 158
830 PRINT"{CLR}":POKEBC,2:POKEBK,1:PRINT:
PRINT:PRINTSPC(130)"{BLK}**CONGRATULA
TIONS**"                        :rem 183
840 PRINTSPC(173)"{RED}YOU GUESSED IT"
                                :rem 5
850 PRINTSPC(191);             :rem 55
860 FOR Q= 1TO 1000:NEXT:T=1:GOTO300
                                :rem 113
870 DATA255,1,1,1,127,255,255,127,255,0,0
,3,3,255,255,0                :rem 178
880 DATA255,255,255,255,255,255,255,255,1
70,170,255,255,255,255,255 :rem 6
890 DATA60,126,255,255,129,66,36,24,16,18
,60                             :rem 183
900 DATA88,40,36,66,0,17,130,68,37,6,148,
93,126                          :rem 72
910 DATA31,21,200,30,25,450,31,21,200,96,
22,200,30,25,200,96,22,200,31,21,200
                                :rem 184
920 DATA30,25,500,-1,-1,-1    :rem 10

```

Program 2: Number Quest—VIC Version

```

10 PRINT"{CLR}{11 DOWN}{5 RIGHT}PLEASE WA
IT"                             :rem 0
20 POKE55,0:POKE56,28:CLR       :rem 220
30 B=7168:CB=25600:FORJ=0TO511:POKEB+J,PE
EK(B+J+CB):NEXTJ               :rem 175
40 FORI=216TO255:READA$:POKEB+I,A$:NEXTI:
FORI=280TO295:READA$:POKEB+I,A$:NEXTI:
PRINT"{CLR}"                   :rem 41
50 POKE36869,240:SC=36879:POKESC,233
                                :rem 71
60 PRINTSPC(89)"{BLK}{2 SPACES}[M]M[2 G]
[2 M]MN[G]O[G]O O[G]"         :rem 114
70 PRINT"[3 SPACES][M] [G]L[M]{2 SPACES}
[G]O[G]O O[G]"                :rem 13
80 PRINTTAB(12)"[T] [T]"       :rem 10
90 PRINT"{RED}{5 SPACES}OP [G][M] O O PO"
                                :rem 126
100 PRINT"{5 SPACES}L[F]L[F] O P [M][G]"
                                :rem 20
110 PRINTTAB(11)"[T] [T]"      :rem 51
120 V=36878:F2=36875:POKEV,15  :rem 131
130 READA$,D$:IFA$=-1THEN150    :rem 58
140 POKEF2,A$:FORT=1TOD$:NEXTT:GOTO130
                                :rem 145
150 POKEV,0:POKEF2,0           :rem 180
160 FORT=1TO1000:NEXTT          :rem 113
170 PRINT"{CLR}":POKESC,26:PRINTSPC(157)"
{BLK}YOU HAVE {RED}5 {BLK}TURNS"
                                :rem 156
180 PRINT:PRINT"{2 SPACES}TO GUESS
{2 SPACES}A NUMBER"           :rem 101
190 PRINT:PRINT"{BLK}{4 SPACES}FROM {RED}
10 {BLK}TO {RED}100":FORT=1TO4000:NEX
TT                               :rem 106
200 PRINT"{CLR}":POKESC,27:T=1:POKE36869

```

```

,255                             :rem 21
210 PRINTSPC(46)"{BLU}GUESS THE NUMBER"
                                :rem 85
220 PRINT:PRINT:PRINTTAB(14)"{BLK}[£":PR
INT"{12 DOWN}":PRINTTAB(10)"{BLK}]"
                                :rem 31
230 PRINT"{BLK}]]]]]]]]]]]]]]]]]]]]{BLU}↑↑
{BLK}]]]]]";:PRINT"]]" ;     :rem 224
240 PRINT"]]]]]]]]]]]]]]]]]]]]":POKE8163,2
9:POKE38883,0                   :rem 243
250 FORN=0TO21:POKE8164+N,29:POKE38884+N,
0:NEXTN                          :rem 159
260 PRINT"{16 UP}"             :rem 121
270 R=INT(RND(1)*90+10)         :rem 233
280 PRINT"{BLK}{2 SPACES}TURN: "; "{RED}";
TN:PRINT                          :rem 189
290 S$="" :INPUT"{RED}{3 SPACES}";S$
                                :rem 111
300 S=VAL(S$):IFS<1ORS>100THENGOSUB570
                                :rem 101
310 FORU=1TOLEN(S$):UQ=ASC(MID$(S$,U,1))
                                :rem 113
320 IF UQ<48OR UQ>57THENU=LEN(S$):NEXT:GO
SUB570:GOTO280                  :rem 167
330 NEXT                         :rem 213
340 IF S>2THEN370               :rem 178
350 PRINT"THAT'S TOO EASY";:FOR T= 0TO100
0:NEXT                           :rem 50
360 PRINT"{15 LEFT}{15 SPACES}{2 UP}":GOT
O290                             :rem 205
370 IFS=RTHEN650                :rem 213
380 TN=TN+1:IFTN=6THEN410       :rem 26
390 IFS>RTHEN490                :rem 218
400 IFS<RTHEN510                :rem 201
410 POKEV,15:FORM=220TO190STEP-1:POKEF2,M
:FORT=1TO20:NEXTT:NEXTM:POKEF2,0:POKE
V,0                               :rem 239
420 P=14:GOSUB580:POKEX,36:POKECX,6:POKEX
+22,30:POKECX+22,6             :rem 111
430 POKE36877,220:FORL=15TO5STEP-1:POKEV,
L:FORM=1TO50                   :rem 50
440 NEXTM:NEXTL:POKE36877,0:POKEV,0
                                :rem 216
450 PRINT"{CLR}":POKESC,216:PRINTSPC(157)
"{BLK}SORRY, YOU MISSED"       :rem 189
460 PRINTSPC(46)"THE NUMBER WAS {RED}";R
                                :rem 74
470 PRINTSPC(49)"{BLK}BETTER LUCK
{12 SPACES}NEXT TIME":FORT=1TO1000:NE
XTT                              :rem 23
480 GOTO700                     :rem 108
490 D=INT(S/R):D$="HIGH":IFD<=1THEN560
                                :rem 242
500 GOTO520                     :rem 101
510 D=INT(R/S):D$="LOW":IFD<=1THEN560
                                :rem 189
520 PRINT"{RED} ";D;"{BLK} TIMES TOO ";
"{RED}";D$                      :rem 196
530 POKEV,15:FORM=250TO180STEP-1:POKEF2,M
:NEXTM:FORT=1TO1000:NEXT:POKEV,0
                                :rem 194
540 PRINT"{2 UP}{10 SPACES}"    :rem 140
550 PRINT"{21 SPACES}":PRINT"{5 UP}":GOTO
280                              :rem 88
560 PRINT"{RED} TOO "; "{BLU}";D$:FORT=1TO
400:NEXT:GOTO530                :rem 89
570 PRINT"{RED} TRY 1-100{2 SPACES}":FORT
=1TO800:NEXTT:PRINT"{UP}{11 SPACES}":
PRINT"{5 UP}":GOTO280          :rem 235
580 X=7680+(5*22)+17:ZX=X+30720:Z=7680+(5
*22)+15:CZ=Z+30720            :rem 117

```

```

590 FORN=1TOP:POKEZ,32:POKEZ+1,32:POKEX,3
      2:POKEX+22,32 :rem 107
600 POKEZ-1,27:POKECZ-1,0:POKEZ,28:POKECZ
      ,0 :rem 141
610 POKEZ+22,31:POKECX+22,0:POKEX+44,35:P
      OKECX+44,0 :rem 7
620 Z=Z-1:CZ=CZ-1:X=X+22:CX=CX+22:NEXTN:R
      ETURN :rem 201
630 BL=36865:FORN=1TO6:POKEBL,135:FORT=1T
      O50:NEXTT :rem 154
640 POKEBL,25:FORT=1TO40:NEXTT:NEXTN:RETU
      RN :rem 130
650 GOSUB630:P=5:GOSUB580:FORN=1TO7
      :rem 190
660 POKEZ,32:POKEZ+22,32 :rem 149
670 POKEZ+21,31:POKECX+21,0:POKEX+43,35:P
      OKECX+43,0:X=X+21:CX=CX+21:NEXTN
      :rem 192
680 POKEV,15:FORL=130TO240:POKEF2,L:NEXTL
      :POKEV,0:FORT=1TO1000:NEXTT :rem 121
690 PRINT"{CLR}":POKESC,26:PRINTSPC(157)"
      CONGRATULATIONS":PRINTSPC(69)"YOU
      {2 SPACES}GUESSED IT" :rem 77
700 FORT=1TO2000:NEXTT:GOTO200 :rem 119
710 DATA255,1,1,1,127,255,255,127,255,0,0
      ,3,3,255,255,0 :rem 171
720 DATA255,255,255,255,255,255,255,255,1
      70,170,255,255,255,255,255 :rem 255
730 DATA60,126,255,255,129,66,36,24,16,18
      ,60,88,40,36,66,0,17,130,68,37,6,148,
      93,126 :rem 113
740 DATA231,200,235,450,231,200,232,200,2
      35,200,232,200,231,200,235,500,-1,-1
      :rem 181
190 DATA 2,230,4,202,208,247,76,65,1034
      :rem 122
200 DATA 193,173,0,221,41,3,73,3,707
      :rem 220
210 DATA 160,6,10,136,208,252,133,4,909
      :rem 117
220 DATA 173,24,208,41,8,240,7,24,725
      :rem 23
230 DATA 169,32,101,4,133,4,169,0,612
      :rem 14
240 DATA 133,3,96,24,165,3,105,64,593
      :rem 31
250 DATA 133,13,165,4,105,31,133,14,598
      :rem 120
260 DATA 96,169,0,32,189,255,169,4,914
      :rem 102
270 DATA 162,4,160,255,32,186,255,32,1086
      :rem 231
280 DATA 192,255,32,204,255,162,4,32,1136
      :rem 224
290 DATA 201,255,169,13,32,210,255,169,13
      04 :rem 68
300 DATA 0,32,189,255,169,6,162,4,817
      :rem 35
310 DATA 160,6,32,186,255,32,192,255,1118
      :rem 227
320 DATA 32,204,255,162,6,32,201,255,1147
      :rem 214
330 DATA 169,18,32,210,255,169,0,32,885
      :rem 135
340 DATA 189,255,169,5,162,4,160,5,949
      :rem 99
350 DATA 32,186,255,32,192,255,32,204,118
      8 :rem 28
360 DATA 255,162,4,32,201,255,169,254,133
      2 :rem 20
370 DATA 32,210,255,169,141,32,210,255,13
      04 :rem 58
380 DATA 96,32,204,255,162,5,32,201,987
      :rem 137
390 DATA 255,162,0,181,240,32,210,255,133
      5 :rem 11
400 DATA 232,224,8,208,246,169,13,32,1132
      :rem 219
410 DATA 210,255,32,204,255,162,4,32,1154
      :rem 210
420 DATA 201,255,166,10,240,8,169,29,1078
      :rem 230
430 DATA 32,210,255,202,208,248,169,254,1
      578 :rem 129
440 DATA 32,210,255,169,141,32,210,255,13
      04 :rem 56
450 DATA 230,10,165,10,201,58,208,9,891
      :rem 123
460 DATA 169,18,133,10,169,13,32,210,754
      :rem 177
470 DATA 255,96,169,0,133,240,133,241,126
      7 :rem 27
480 DATA 133,242,133,243,133,244,133,245,
      1506 :rem 164
490 DATA 133,246,133,247,133,15,169,128,1
      204 :rem 125
500 DATA 133,16,169,0,133,17,164,17,649
      :rem 130
510 DATA 177,3,37,16,240,16,169,128,786
      :rem 144
520 DATA 166,17,240,4,74,202,208,252,1163
      :rem 221
530 DATA 166,15,21,240,149,240,230,17,107
      8 :rem 15

```

1526 Hi-Res Screen Dump

(Article on page 113.)

```

10 PRINT"{CLR}":PRINT TAB(12)"1526 HI-RES
      DUMP" :rem 7
20 PRINT:PRINT"PLEASE WAIT ...":PRINT
      :rem 58
30 READ LN,SA,EA:LN=LN+30 :rem 196
40 FOR I=0 TO EA-SA :rem 235
50 READ BY:POKE SA+I,BY:SUM=SUM+BY
      :rem 123
60 IF INT((I+1)/8)*8<>(I+1) THEN90
      :rem 248
70 READ CS:IF CS<>SUM THEN120 :rem 169
80 SUM=0:LN=LN+10 :rem 1
90 NEXT :rem 168
100 IF INT(I/8)*8<>I THEN READ CS:IF CS<>
      SUM THEN120 :rem 162
110 PRINT:PRINT"TYPE SYS49152 TO BEGIN HI
      -RES DUMP":END :rem 103
120 PRINT"**** ERROR IN LINE";LN :rem 42
130 DATA 100 :rem 63
140 DATA 49152 :rem 180
150 DATA 49521 :rem 181
160 DATA 169,18,133,10,32,33,192,32,619
      :rem 126
170 DATA 67,192,32,81,192,76,84,193,917
      :rem 156
180 DATA 32,177,192,162,8,230,3,208,1012
      :rem 170

```

540 DATA 165,17,201,8,208,224,70,16,909
:rem 132
550 DATA 230,15,165,15,201,8,208,210,1052
:rem 209
560 DATA 96,165,3,197,13,208,10,165,857
:rem 147
570 DATA 4,197,14,208,4,32,231,255,945
:rem 87
580 DATA 0,76,13,192,169,0,133,17,600
:rem 25
590 DATA 164,17,177,3,208,14,230,17,830
:rem 132
600 DATA 165,17,201,8,208,242,32,232,1105
:rem 212
610 DATA 192,76,19,192,32,250,192,76,1029
:rem 241
620 DATA 16,192,208 :rem 167

37134 :024,144,032,205,189,169,009
37140 :000,133,095,169,002,133,040
37146 :096,169,000,133,073,169,154
37152 :086,141,000,002,169,002,176
37158 :141,001,002,076,237,166,149
37164 :173,023,144,133,020,173,198
37170 :024,144,133,021,032,019,167
37176 :166,076,201,166,072,165,134
37182 :203,201,063,240,154,104,003
37188 :096,072,165,203,201,063,100
37194 :240,145,104,076,237,246,098
37200 :141,018,144,024,165,144,204
37206 :240,045,032,033,159,169,252
37212 :015,162,008,168,032,186,151
37218 :255,169,000,032,189,255,230
37224 :032,192,255,162,015,032,024
37230 :198,255,032,207,255,072,105
37236 :032,210,255,104,201,013,163
37242 :208,244,169,015,032,195,217
37248 :255,032,204,255,056,173,079
37254 :018,144,096,160,255,200,239
37260 :185,000,002,208,250,096,113
37266 :032,121,000,201,000,240,228
37272 :039,032,115,000,144,008,234
37278 :201,034,240,004,056,076,001
37284 :181,145,032,158,173,165,250
37290 :013,208,009,032,155,188,007
37296 :165,100,164,101,024,096,058
37302 :032,130,183,141,029,144,073
37308 :166,034,164,035,056,096,227
37314 :120,169,235,141,004,003,098
37320 :169,145,141,005,003,169,064
37326 :065,141,020,003,169,147,239
37332 :141,021,003,032,062,148,107
37338 :088,165,056,201,144,144,248
37344 :007,169,144,133,056,032,253
37350 :092,166,076,055,158,162,171
37356 :255,232,189,000,002,201,091
37362 :032,240,248,160,255,141,038
37368 :023,144,200,192,224,175,183
37374 :079,217,081,146,208,024,241
37380 :140,024,144,142,025,144,111
37386 :232,200,185,081,146,048,134
37392 :029,221,000,002,240,244,240
37398 :172,024,144,174,025,144,193
37404 :200,192,224,176,045,185,026
37410 :081,146,016,246,173,023,207
37416 :144,200,200,076,250,145,031
37422 :142,027,144,134,122,232,079
37428 :189,000,002,240,004,201,176
37434 :065,176,017,200,185,081,014
37440 :146,141,076,146,200,185,190
37446 :081,146,141,077,146,076,225
37452 :039,159,076,124,165,065,192
37458 :085,084,207,021,152,066,185
37464 :083,065,086,197,039,159,205
37470 :067,065,212,047,147,067,187
37476 :072,065,078,071,197,212,027
37482 :155,068,069,070,065,085,106
37488 :076,212,242,147,068,069,158
37494 :076,069,084,197,182,148,106
37500 :068,076,073,083,212,040,164
37506 :144,068,085,077,208,087,031
37512 :151,069,082,210,056,148,084
37518 :070,073,078,196,200,155,146
37524 :072,069,076,208,238,157,200
37530 :073,078,212,194,145,075,163
37536 :069,217,149,147,076,076,126
37542 :073,083,212,144,157,077,144

MetaBASIC

(Article on page 114.)

36864 :076,194,145,000,000,000,159
36870 :000,000,000,000,000,000,006
36876 :000,000,063,000,000,000,075
36882 :199,008,000,000,000,066,035
36888 :006,000,000,004,000,008,042
36894 :000,000,000,000,000,000,030
36900 :000,169,001,044,169,000,163
36906 :141,036,144,032,146,145,174
36912 :169,069,141,040,003,169,127
36918 :145,141,041,003,173,029,074
36924 :144,133,183,134,187,132,205
36930 :188,160,002,169,000,153,226
36936 :086,002,136,016,250,169,219
36942 :008,133,186,169,096,133,035
36948 :185,032,108,144,144,021,206
36954 :169,002,032,195,255,169,144
36960 :015,032,195,255,032,231,088
36966 :255,162,005,108,000,003,123
36972 :032,213,243,165,186,032,211
36978 :180,255,165,185,032,150,057
36984 :255,169,152,141,000,003,072
36990 :169,144,141,001,003,169,241
36996 :044,141,002,003,169,145,124
37002 :141,003,003,032,165,255,225
37008 :032,080,145,176,072,032,169
37014 :165,255,032,165,255,141,139
37020 :023,144,032,165,255,013,020
37026 :023,144,240,055,032,165,053
37032 :255,133,020,141,023,144,116
37038 :032,165,255,133,021,141,153
37044 :024,144,173,036,144,208,141
37050 :004,160,001,208,002,160,209
37056 :255,200,032,165,255,153,228
37062 :000,002,208,247,032,060,235
37068 :145,032,137,145,152,024,071
37074 :105,005,168,173,036,144,073
37080 :240,045,076,162,164,032,167
37086 :171,255,032,066,246,032,000
37092 :231,255,169,131,141,002,133
37098 :003,169,164,141,003,003,205
37104 :169,139,141,000,003,169,093
37110 :227,141,001,003,169,237,000
37116 :141,040,003,169,246,141,224
37122 :041,003,076,055,158,032,111
37128 :033,159,174,023,144,173,202

37548 :069,077,079,082,217,057,241
37554 :149,077,069,082,071,197,055
37560 :037,144,077,079,078,073,160
37566 :084,079,210,004,150,078,027
37572 :085,077,066,069,210,166,101
37578 :150,081,085,073,212,001,036
37584 :150,082,069,065,196,103,105
37590 :148,082,069,078,085,205,113
37596 :000,153,082,069,083,065,160
37602 :086,197,014,150,083,067,055
37608 :082,065,084,067,200,005,223
37614 :150,083,069,078,196,025,071
37620 :150,083,080,069,069,196,123
37626 :229,157,083,084,065,082,182
37632 :212,106,148,084,069,082,189
37638 :077,073,078,065,204,064,055
37644 :158,084,082,065,067,197,153
37650 :174,152,084,082,079,070,147
37656 :198,243,152,085,078,078,090
37662 :069,215,155,150,086,067,004
37668 :072,065,078,071,197,188,195
37674 :155,064,160,208,147,160,168
37680 :001,185,061,147,145,122,197
37686 :200,192,004,208,246,076,212
37692 :040,144,034,036,000,165,223
37698 :203,205,014,144,240,074,178
37704 :141,014,144,201,003,208,015
37710 :004,169,007,208,008,201,163
37716 :004,144,059,201,007,176,163
37722 :055,056,233,004,010,010,202
37728 :010,010,010,174,141,002,187
37734 :240,003,024,105,016,168,146
37740 :162,000,185,097,159,201,144
37746 :095,208,002,169,013,201,034
37752 :039,208,008,165,212,073,057
37758 :001,133,212,169,034,201,108
37764 :000,240,009,157,119,002,147
37770 :232,200,224,010,208,222,210
37776 :134,198,076,049,234,032,099
37782 :146,145,136,152,048,047,056
37788 :201,008,176,043,010,010,092
37794 :010,010,024,105,097,133,029
37800 :251,169,159,105,000,133,217
37806 :252,032,146,145,144,023,148
37812 :173,029,144,201,011,176,146
37818 :016,168,169,000,145,251,167
37824 :136,177,034,145,251,136,047
37830 :016,249,076,055,158,162,146
37836 :011,108,000,003,169,255,238
37842 :133,251,032,166,145,176,089
37848 :242,140,234,147,141,235,075
37854 :147,032,146,145,176,011,111
37860 :152,230,251,164,251,153,149
37866 :000,000,076,223,147,108,020
37872 :002,003,120,169,095,141,002
37878 :024,003,169,157,141,025,253
37884 :003,088,169,003,133,251,131
37890 :032,146,145,176,010,152,151
37896 :166,251,157,019,144,198,175
37902 :251,016,241,169,040,141,104
37908 :050,003,169,148,141,051,070
37914 :003,169,048,141,048,003,182
37920 :169,148,141,049,003,076,106
37926 :055,158,174,019,144,134,210
37932 :186,076,237,245,174,019,213
37938 :144,134,186,076,165,244,231
37944 :032,088,145,076,055,158,098
37950 :169,073,141,038,003,169,143
37956 :148,141,039,003,096,072,055
37962 :138,072,152,072,173,141,054

37968 :002,208,251,174,012,144,103
37974 :232,160,001,136,208,253,052
37980 :202,208,250,104,168,104,104
37986 :170,104,076,202,241,169,036
37992 :001,044,169,000,141,011,214
37998 :144,032,146,145,032,189,030
38004 :255,169,002,162,008,160,104
38010 :002,032,186,255,032,192,053
38016 :255,144,003,076,090,144,072
38022 :162,002,032,198,255,032,047
38028 :165,255,032,080,145,176,225
38034 :024,174,011,144,208,010,205
38040 :170,032,165,255,032,205,243
38046 :189,076,171,148,032,210,216
38052 :255,032,060,145,076,139,103
38058 :148,169,002,032,195,255,203
38064 :032,204,255,076,055,158,188
38070 :032,146,145,176,115,132,160
38076 :253,133,254,032,049,149,034
38082 :160,002,177,095,141,023,024
38088 :144,200,177,095,141,024,213
38094 :144,165,095,133,251,165,135
38100 :096,133,252,032,146,145,248
38106 :176,082,200,208,003,024,143
38112 :105,001,032,049,149,056,104
38118 :165,101,229,253,165,100,219
38124 :229,254,144,062,160,000,061
38130 :140,000,002,165,095,145,021
38136 :251,200,165,096,145,251,076
38142 :173,023,144,133,020,173,152
38148 :024,144,133,021,160,005,235
38154 :173,002,003,133,251,173,233
38160 :003,003,133,252,169,033,097
38166 :141,002,003,169,149,141,115
38172 :003,003,076,162,164,165,089
38178 :251,141,002,003,165,252,080
38184 :141,003,003,076,049,158,214
38190 :076,203,147,132,020,133,245
38196 :021,032,019,166,096,032,162
38202 :146,145,132,251,133,252,093
38208 :032,146,145,132,253,133,137
38214 :254,032,184,149,076,116,113
38220 :149,032,060,145,056,165,171
38226 :253,229,251,165,254,229,183
38232 :252,176,010,173,028,144,103
38238 :201,001,208,003,076,055,126
38244 :158,238,028,144,173,028,101
38250 :144,201,006,208,005,169,071
38256 :001,032,147,149,173,028,130
38262 :144,010,010,024,105,008,163
38268 :133,211,160,000,177,251,032
38274 :032,210,149,169,058,032,012
38280 :210,255,230,251,208,002,012
38286 :230,252,076,077,149,169,071
38292 :058,032,210,255,169,018,122
38298 :032,210,255,198,252,160,237
38304 :250,177,251,201,032,144,191
38310 :007,201,127,176,003,076,244
38316 :176,149,169,046,032,210,186
38322 :255,200,208,235,230,252,022
38328 :032,033,159,169,032,032,129
38334 :210,255,165,252,166,251,209
38340 :032,205,189,169,000,141,164
38346 :028,144,169,062,032,210,079
38352 :255,096,168,032,162,179,076
38358 :032,221,189,160,255,200,247
38364 :185,000,001,208,250,140,236
38370 :023,144,136,136,136,185,218
38376 :000,001,201,049,144,007,122
38382 :201,058,176,003,076,247,231

38388 :149,169,048,032,210,255,083
38394 :200,204,023,144,208,231,236
38400 :096,032,083,228,000,169,096
38406 :000,141,017,144,133,180,109
38412 :240,020,169,000,141,017,087
38418 :144,169,001,133,180,208,085
38424 :009,169,001,141,017,144,249
38430 :169,000,133,180,032,146,178
38436 :145,172,029,144,169,000,183
38442 :153,003,002,136,177,034,035
38448 :153,003,002,136,016,248,094
38454 :173,017,144,208,011,160,255
38460 :002,185,084,151,153,000,123
38466 :002,136,016,247,169,015,139
38472 :162,008,160,015,032,186,123
38478 :255,032,137,145,152,174,205
38484 :017,144,240,009,056,233,015
38490 :003,162,003,160,002,208,116
38496 :004,162,000,160,002,032,200
38502 :189,255,032,192,255,144,145
38508 :003,076,090,144,169,015,093
38514 :032,195,255,165,180,240,157
38520 :028,169,003,162,008,160,138
38526 :003,032,186,255,173,029,036
38532 :144,162,003,160,002,032,123
38538 :189,255,169,043,166,045,237
38544 :164,046,032,216,255,032,121
38550 :080,145,076,055,158,160,056
38556 :001,152,145,043,032,051,068
38562 :165,076,049,158,032,146,020
38568 :145,176,050,132,251,133,031
38574 :252,072,169,036,032,210,177
38580 :255,104,032,192,150,152,041
38586 :032,192,150,076,240,150,002
38592 :072,074,074,074,074,032,080
38598 :207,150,104,041,015,032,235
38604 :207,150,096,201,010,144,244
38610 :003,024,105,007,024,105,222
38616 :048,032,210,255,096,169,002
38622 :000,133,251,133,252,168,135
38628 :200,177,122,208,071,165,147
38634 :252,166,251,032,205,189,049
38640 :032,033,159,169,000,166,031
38646 :251,032,205,189,169,032,100
38652 :032,210,255,169,000,166,060
38658 :252,032,205,189,032,033,233
38664 :159,169,037,032,210,255,102
38670 :169,000,141,028,144,162,146
38676 :016,169,048,006,251,038,036
38682 :252,144,005,169,049,238,115
38688 :028,144,172,028,144,240,020
38694 :003,032,210,255,202,208,180
38700 :232,076,055,158,162,004,219
38706 :006,251,038,252,202,208,239
38712 :249,032,074,151,024,101,175
38718 :251,133,251,165,252,105,195
38724 :000,133,252,076,228,150,139
38730 :056,233,048,201,010,144,254
38736 :002,233,007,096,083,048,037
38742 :058,032,088,159,234,165,054
38748 :046,133,252,076,116,151,098
38754 :169,058,032,210,255,165,219
38760 :251,024,105,007,133,251,107
38766 :165,252,105,000,133,252,249
38772 :160,000,056,165,251,229,209
38778 :047,165,252,229,048,144,239
38784 :005,169,000,076,049,168,083
38790 :169,000,141,028,144,177,025
38796 :251,016,004,056,046,028,029
38802 :144,041,127,032,210,255,187

38808 :200,177,251,016,004,056,088
38814 :046,028,144,041,127,240,016
38820 :003,032,210,255,173,028,097
38826 :144,208,024,032,004,152,222
38832 :200,152,024,101,251,072,208
38838 :165,252,105,000,168,104,208
38844 :032,162,187,032,010,152,251
38850 :076,098,151,201,003,208,163
38856 :026,169,037,032,210,255,161
38862 :032,004,152,200,177,251,254
38868 :072,200,177,251,168,104,160
38874 :032,145,179,032,010,152,000
38880 :076,098,151,201,001,208,191
38886 :026,169,036,032,210,255,190
38892 :032,004,152,200,177,251,028
38898 :072,200,177,251,133,034,085
38904 :200,177,251,133,035,104,124
38910 :032,036,171,076,098,151,050
38916 :169,061,032,210,255,096,059
38922 :032,221,189,072,152,170,078
38928 :104,032,030,171,096,032,225
38934 :146,145,140,034,144,141,004
38940 :035,144,032,146,145,140,158
38946 :032,144,141,033,144,173,189
38952 :034,144,056,237,032,144,175
38958 :141,034,144,173,035,144,205
38964 :237,033,144,141,035,144,018
38970 :173,034,144,133,020,173,223
38976 :035,144,133,021,120,169,174
38982 :093,141,002,003,169,152,118
38988 :141,003,003,169,141,141,162
38994 :020,003,169,152,141,021,076
39000 :003,088,076,055,158,165,121
39006 :020,024,109,032,144,133,044
39012 :099,165,021,109,033,144,159
39018 :133,098,162,144,056,032,219
39024 :073,188,032,221,189,162,209
39030 :000,189,001,001,240,006,043
39036 :157,119,002,232,208,245,063
39042 :169,032,157,119,002,232,073
39048 :134,198,076,131,164,032,103
39054 :225,255,208,025,120,169,120
39060 :131,141,002,003,169,164,246
39066 :141,003,003,169,065,141,164
39072 :020,003,169,147,141,021,149
39078 :003,032,033,159,088,076,045
39084 :065,147,169,195,141,008,129
39090 :003,169,152,141,009,003,143
39096 :169,000,141,030,144,141,041
39102 :031,144,076,055,158,165,051
39108 :058,201,255,240,039,173,138
39114 :030,144,197,057,208,009,079
39120 :173,031,144,197,058,208,251
39126 :002,240,023,169,091,032,003
39132 :210,255,166,057,142,030,056
39138 :144,165,058,141,031,144,141
39144 :032,201,189,169,093,032,180
39150 :210,255,076,228,167,169,063
39156 :228,141,008,003,169,167,192
39162 :141,009,003,076,055,158,180
39168 :032,157,155,169,010,141,152
39174 :006,144,141,008,144,169,106
39180 :000,141,011,144,141,007,200
39186 :144,141,009,144,032,146,122
39192 :145,176,017,140,006,144,140
39198 :141,007,144,032,146,145,133
39204 :176,006,140,008,144,141,139
39210 :009,144,160,000,177,188,208
39216 :141,023,144,200,177,188,153
39222 :013,023,144,240,058,200,220

39228 :200,200,177,188,240,074,115
39234 :201,044,208,005,173,011,196
39240 :144,208,081,177,188,016,118
39246 :238,201,137,240,073,201,144
39252 :141,240,069,201,167,208,086
39258 :019,140,023,144,200,177,025
39264 :188,201,032,240,249,172,154
39270 :023,144,201,058,144,048,208
39276 :176,207,169,000,141,011,044
39282 :144,240,200,169,001,141,241
39288 :028,144,169,255,133,100,181
39294 :133,101,032,051,165,032,128
39300 :198,154,032,146,155,076,125
39306 :049,158,200,152,024,101,054
39312 :188,133,188,165,189,105,088
39318 :000,133,189,076,044,153,233
39324 :140,015,144,200,177,188,252
39330 :201,032,240,249,172,015,047
39336 :144,201,058,176,004,201,184
39342 :048,176,003,076,061,153,179
39348 :169,001,141,011,144,200,078
39354 :024,152,101,188,133,122,138
39360 :133,186,165,189,105,000,202
39366 :133,123,133,187,140,023,169
39372 :144,032,073,155,169,000,009
39378 :141,028,144,165,122,133,175
39384 :146,165,123,133,147,032,194
39390 :051,165,032,198,154,032,086
39396 :084,155,024,101,186,133,143
39402 :148,165,187,105,000,133,204
39408 :149,169,004,141,029,144,108
39414 :032,013,154,172,023,144,016
39420 :162,255,232,189,000,001,067
39426 :208,003,076,062,153,145,137
39432 :188,200,076,254,153,032,143
39438 :033,154,176,014,024,165,068
39444 :182,109,029,144,133,182,031
39450 :165,183,105,000,133,183,027
39456 :096,056,165,148,229,146,104
39462 :141,024,144,165,149,229,122
39468 :147,013,024,144,208,001,069
39474 :096,144,066,032,184,154,214
39480 :165,181,170,005,180,208,197
39486 :001,096,024,138,101,147,057
39492 :141,099,154,165,146,141,146
39498 :098,154,024,138,101,149,226
39504 :141,102,154,165,148,141,163
39510 :101,154,232,164,180,208,101
39516 :004,240,013,160,255,185,181
39522 :000,000,153,000,000,136,131
39528 :192,255,208,245,206,099,029
39534 :154,206,102,154,202,208,112
39540 :234,024,096,032,184,154,072
39546 :165,146,141,154,154,165,023
39552 :147,141,155,154,165,148,014
39558 :141,157,154,165,149,141,017
39564 :158,154,166,181,240,032,047
39570 :169,000,141,010,144,160,002
39576 :000,185,000,000,153,000,234
39582 :000,200,204,010,144,208,156
39588 :244,238,155,154,238,158,071
39594 :154,224,000,240,007,202,229
39600 :208,224,165,180,208,222,103
39606 :056,096,056,165,182,229,198
39612 :146,133,180,165,183,229,200
39618 :147,133,181,096,173,006,162
39624 :144,133,184,173,007,144,217
39630 :133,185,173,004,144,133,210
39636 :253,173,005,144,133,254,150
39642 :160,000,177,253,133,167,084

39648 :200,177,253,133,168,005,136
39654 :167,240,075,200,177,253,062
39660 :056,229,101,141,013,144,152
39666 :200,177,253,229,100,013,190
39672 :013,144,208,018,173,028,064
39678 :144,208,012,169,032,032,083
39684 :210,255,166,184,165,185,145
39690 :032,205,189,096,176,036,232
39696 :173,028,144,240,015,152,000
39702 :072,160,002,165,184,145,238
39708 :253,200,165,185,145,253,205
39714 :104,168,165,184,024,109,020
39720 :008,144,133,184,165,185,091
39726 :109,009,144,076,060,155,087
39732 :169,255,133,184,133,185,087
39738 :208,192,133,185,165,167,084
39744 :133,253,165,168,133,254,146
39750 :076,218,154,032,158,173,113
39756 :032,155,188,165,100,164,112
39762 :101,096,160,255,200,185,055
39768 :000,001,208,250,152,096,027
39774 :165,043,133,251,165,044,127
39780 :133,252,160,000,177,251,049
39786 :208,018,232,224,003,208,231
39792 :015,152,056,101,251,133,052
39798 :045,165,252,105,000,133,050
39804 :046,096,162,000,200,208,068
39810 :229,230,252,208,225,162,156
39816 :044,181,146,157,211,159,010
39822 :202,016,248,096,162,044,142
39828 :189,211,159,149,146,202,180
39834 :016,248,096,032,135,155,068
39840 :165,045,024,105,005,133,125
39846 :182,165,046,105,000,133,029
39852 :183,165,043,133,188,141,001
39858 :004,144,165,044,133,189,089
39864 :141,005,144,096,169,000,227
39870 :141,011,144,169,001,141,029
39876 :013,144,208,020,169,001,239
39882 :141,011,144,169,000,141,040
39888 :013,144,240,008,169,000,014
39894 :141,011,144,141,013,144,040
39900 :032,124,165,032,026,157,244
39906 :032,157,155,169,255,141,111
39912 :008,144,141,009,144,169,079
39918 :002,133,123,032,146,145,051
39924 :176,026,132,020,133,021,240
39930 :032,019,166,165,095,133,092
39936 :188,165,096,133,189,032,035
39942 :146,145,176,006,140,008,115
39948 :144,141,009,144,160,000,098
39954 :177,188,141,023,144,200,123
39960 :177,188,013,023,144,240,041
39966 :072,162,000,200,177,188,061
39972 :133,020,237,008,144,200,010
39978 :177,188,133,021,237,009,039
39984 :144,144,002,176,050,200,252
39990 :177,188,240,029,205,011,136
39996 :001,208,246,140,023,144,054
40002 :162,000,200,232,189,011,092
40008 :001,201,064,240,035,209,054
40014 :188,240,243,172,023,144,064
40020 :076,053,156,200,152,024,233
40026 :101,188,133,188,165,189,030
40032 :105,000,133,189,076,016,103
40038 :156,032,051,165,032,146,172
40044 :155,076,049,158,140,024,198
40050 :144,032,051,165,172,023,189
40056 :144,136,192,004,176,001,005
40062 :200,132,180,177,188,141,120

40068 :003,144,174,013,144,240,082
40074 :004,169,113,145,188,032,021
40080 :019,166,169,159,141,000,030
40086 :003,169,156,141,001,003,111
40092 :076,201,166,169,139,141,024
40098 :000,003,169,227,141,001,191
40104 :003,173,003,144,164,180,067
40110 :145,188,172,024,144,173,252
40116 :011,144,240,003,076,054,196
40122 :156,174,013,144,240,022,167
40128 :165,197,197,203,240,252,166
40134 :032,060,145,165,203,201,236
40140 :025,240,007,201,039,208,156
40146 :243,076,054,156,152,024,147
40152 :101,188,133,146,165,189,114
40158 :105,000,133,147,173,023,035
40164 :144,024,109,029,144,133,043
40170 :148,032,251,156,165,148,110
40176 :024,101,188,133,148,032,098
40182 :251,156,076,002,157,165,029
40188 :189,105,000,133,149,096,156
40194 :032,013,154,172,023,144,028
40200 :162,255,232,189,041,001,120
40206 :201,064,208,003,076,054,108
40212 :156,145,188,200,208,240,133
40218 :160,000,200,185,000,002,061
40224 :240,056,201,064,208,246,023
40230 :162,255,232,200,185,000,048
40236 :002,240,043,201,034,240,036
40242 :246,157,011,001,201,064,218
40248 :208,238,173,011,144,208,014
40254 :023,162,255,232,200,185,095
40260 :000,002,240,018,201,034,051
40266 :240,246,157,041,001,201,192
40272 :064,208,238,142,029,144,137
40278 :200,132,122,096,162,011,041
40284 :108,000,003,120,072,138,021
40290 :072,152,072,169,004,141,196
40296 :136,002,032,188,246,032,228
40302 :225,255,240,003,076,114,255
40308 :254,032,163,253,032,024,106
40314 :229,173,021,144,141,033,095
40320 :208,173,022,144,141,032,080
40326 :208,173,020,144,141,134,186
40332 :002,108,002,160,169,004,073
40338 :162,004,160,004,032,186,182
40344 :255,032,192,255,162,004,028
40350 :032,201,255,160,255,200,237
40356 :192,087,240,014,185,000,114
40362 :002,201,045,208,244,169,015
40368 :171,153,000,002,208,237,179
40374 :169,198,141,000,003,169,094
40380 :157,141,001,003,032,115,125
40386 :000,076,156,166,169,139,132
40392 :141,000,003,169,227,141,113
40398 :001,003,162,004,032,201,097
40404 :255,169,013,032,210,255,122
40410 :032,204,255,169,002,032,144
40416 :195,255,076,055,158,032,227
40422 :146,145,140,012,144,076,125
40428 :055,158,169,000,133,251,234
40434 :169,147,032,210,255,169,200
40440 :004,133,214,032,033,159,055
40446 :160,255,200,192,219,144,144
40452 :003,076,055,158,185,081,050
40458 :146,048,006,032,210,255,195
40464 :076,000,158,073,128,032,227
40470 :210,255,165,251,073,001,209
40476 :133,251,208,009,169,000,030
40482 :133,211,032,033,159,208,042

40488 :004,169,020,133,211,200,009
40494 :200,208,207,032,094,155,174
40500 :032,092,166,169,000,133,132
40506 :198,162,128,108,000,003,145
40512 :169,000,133,247,169,206,220
40518 :133,248,169,000,133,249,234
40524 :169,207,133,250,032,231,074
40530 :255,169,001,162,032,160,093
40536 :159,032,189,255,169,002,126
40542 :170,160,003,032,186,255,132
40548 :032,192,255,032,197,158,198
40554 :032,204,255,032,228,255,088
40560 :201,000,240,031,201,092,109
40566 :240,066,168,120,162,054,160
40572 :134,001,185,000,162,162,000
40578 :055,134,001,088,072,162,130
40584 :002,032,201,255,104,032,250
40590 :210,255,032,204,255,162,236
40596 :002,032,198,255,032,228,127
40602 :255,201,000,240,203,041,070
40608 :127,168,120,162,054,134,157
40614 :001,185,000,160,162,055,217
40620 :134,001,088,072,032,204,191
40626 :255,104,032,210,255,076,086
40632 :106,158,032,204,255,169,084
40638 :002,032,195,255,076,055,037
40644 :158,160,255,152,192,219,052
40650 :176,024,192,193,144,006,169
40656 :056,233,128,076,230,158,065
40662 :192,065,144,012,192,096,147
40668 :176,006,024,105,032,076,127
40674 :230,158,169,000,153,000,168
40680 :162,136,192,255,208,217,122
40686 :152,192,128,176,024,192,078
40692 :096,144,006,056,233,032,043
40698 :076,013,159,192,065,144,131
40704 :012,192,091,176,008,024,247
40710 :105,128,076,013,159,169,144
40716 :000,153,000,160,136,192,141
40722 :255,208,217,169,008,141,248
40728 :020,162,169,020,141,008,032
40734 :160,096,006,169,013,032,250
40740 :210,255,096,032,146,145,152
40746 :032,189,255,032,146,145,073
40752 :132,251,133,252,032,146,226
40758 :145,169,002,162,008,168,196
40764 :032,186,255,032,192,255,244
40770 :032,080,145,176,009,169,165
40776 :251,166,101,164,100,032,118
40782 :216,255,169,002,032,195,179
40788 :255,076,055,158,169,001,030
40794 :133,212,165,045,133,251,005
40800 :096,072,013,013,013,013,060

All programs listed
in this magazine
are available on
the GAZETTE Disk.
See elsewhere in
this issue for details.

PRODUCT MART

Am-Cup
AN INCREDIBLE SAILING SIMULATION

*C-64 *SX-64

REQUIREMENTS:
-1541 DRIVE
-2 JOY STICKS

SEND CHECK OR M.O. TO

DREAM DOG SOFTWARE
P.O. BOX 1174,
EUGENE, OR 97440

\$20.00
TO PRINT WOOF

TRADEMARKS OF COMMODORE ELECTRONICS LTD.

Maxell Floppy Disks

The Mini-Disks with maximum quality.

Dealer inquiries invited. C.O.D's accepted.
Call FREE (800) 235-4137.

PACIFIC EXCHANGES
100 Foothill Blvd., San Luis
San Luis Obispo, CA 93401.
In Cal call (800) 592-5935 or
(805)543-1037.

THE TROLL IS HERE!

LET THE MICRO-TROLL PUT YOUR MICRO TO WORK!

Resident operating system in PROM. Includes interactive display mode, a library of command routines, and user programmable 2764 EPROM with Auto-boot for BASIC or machine language programs.

- COMPLETE documentation supplied including documentation for custom control and sensing devices.
- PROM burner programs 2732, 2732A, and 2764 EPROMS
- 16 channel analog to digital converter
- "Sio-Scope" - The ultra-low frequency graphic display with outputs from 10 ms to MONTHS!
- Calendar clock with battery back-up
- 16 individually programmable digital I/O lines
- 2 DAC's (D to A converters) with ± 10 and ± 1 V ranges
- Micro-Troll runs on 110 AC or 8 to 15 Vdc for TOTAL battery back-up capability
- Capacitance meter

\$179.95

Order now or write today for FREE brochure/spec sheet. Micro-Troll is available for VIC 20* and Commodore 64*. All boards pre-tested for reliability.

SMS Slide Mountain Systems (303) 597-2229
P.O. Box 6481 • Colorado Springs • Colorado • 80934

*Commodore 64 and Vic 20 are registered trademarks of Commodore

\$34.95 SPECIAL

Backgammon

FANTASTIC COMPUTER BACKGAMMON
DOUBLE END GAMES • SOUND
COLOR GRAPHIC OPTIONS

DISK

C-64

FUTURE AGE COMPUTERS
3 McCrary Drive S.W.
Rome, GA 30161
Phone (404) 235-4948
Dealer Inquiries Welcome

Super Slot

SLOT MACHINE SIMULATOR
SUPERIOR COLOR GRAPHICS
SOUND AND SPECIAL EFFECTS

\$29.95 SPECIAL

A NECESSITY FOR YOUR DISK SYSTEM

DISK SLEUTH

PROGRAM DIRECTORY SYSTEM

Creates an **ALPHABETIZED DIRECTORY** of all your disks and disk programs. **EASY TO USE**-Reads your disks. Shows **WHERE TO FIND EACH PROGRAM**. Gives **COMPLETE PROGRAM INFORMATION**, including **YOUR OWN PROGRAM COMMENTS**. **PRINT-OUT DIRECTORY**, View, or Search. **PERMANENT DIRECTORY** - 1541 or MSD. **WINDOWS** for all disk information.

\$34.95 Postpaid. Commodore 64 only. California residents add 6% sales tax.

Nth DIGIT SOLUTIONS
3243 Arlington Avenue, No. 195
Riverside, CA 92506

C-64 COVERS

PROTECT YOUR INVESTMENT

- CUSTOM FIT•
- LIGHT TAN•
- LIFETIME WARRANTY•
- WASHABLE•

VIC-20/C-64 COMPUTER
C-1541 DISK DRIVE
C-1530 DATASETTE
C-1525 PRINTER
MPS-801 PRINTER
GEMINI-10/10X PRINTER
EPSON FX80 PRINTER
1701/1702 MONITOR

* ALL COVERS *
* \$6.95 each *

Enclose a check or M/O. for items ordered +\$2.00 shipping & handling. CA. Residents add 6.5% tax

DES-PRODUCTIONS
9067 BUHMAN ST.
DOWNEY, CA 90240
Dealer's Invited

BASEBALL STATS 3.2

MANAGERS * COACHES *
SCOREKEEPERS

DISPLAY, CHART AND GRAPH ONLY THOSE STATS YOU NEED, TO PRODUCE A WINNING TEAM. FOR ANY LEVEL OF BASEBALL OR SOFTBALL. WRITTEN ENTIRELY IN SUPERFAST BASIC

For C-64: 1541 & 1525
or Equivalents
Send Check or Money Order for \$20.00
to: **Bill Cafarelli Software**
P.O. Box 559
Sandy Hook CT 06482

DISKS \$1.00

SSDD

DSDD - \$1.39
IBM PREFORMATTED (360K) \$1.55

QUALITY MEDIA • ANY QUANTITY
LIFETIME REPLACEMENT
GUARANTEE
HUB RINGS • TYVEC ENVELOPES

Because we buy in huge volume to supply software manufacturers, our prices can't be beat.

BLACKSHIP COMPUTER SUPPLY
PO Box 883362 • San Francisco, CA 94188
(415) 550-0512

Add \$3.00 shipping and handling
(CA residents add 6.5%) VISA/MC/COD

ALL THE BEST PRICES

Commodore

M-801 Dot Matrix Parallel.....	\$219.00
MCS 803 Dot Matrix.....	\$179.00
1520 Color Printer/Plotter.....	\$129.00
1530 Datasette.....	\$49.99
1641 Disk Drive.....	\$249.00
1699 Vic Modem.....	\$59.99
1610 Vic Term 40.....	\$59.99
1680 Auto Modem.....	\$89.99
1702 Color Monitor.....	\$249.00
DPS Daisywheel Printer.....	\$459.00
Disk Organizer Lock.....	\$49.99
1311 Joystick...each.....	\$5.99
1312 Paddles.....	\$11.99
1110 VIC 8K.....	\$42.00
1111 VIC 16K.....	\$69.99
1211 Super Expander.....	\$53.99

Call for CBM 4 Plus



PRINTERS AXIOM

GP-100 Parallel.....	\$189.00
GP-550 Dual Mode.....	\$269.00

EPSON

RX-80, RX-Soft, RX-100, FX-80, FX-100 CALL	
--	--

JUKI

8100.....	\$449.00
-----------	----------

MANNESMAN TALLY

160L.....	\$689.00
180L.....	\$749.00
Spirit 80.....	\$259.00

NEC

8027 Dot Matrix.....	\$339.00
----------------------	----------

OKIDATA

82, 83, 84, 92, 2350, 2410.....	CALL
Okimate 64.....	\$199.00

OLYMPIA

Compact 2.....	\$469.00
Compact RO.....	\$499.00
Needlepoint Dot Matrix.....	\$329.00

Panasonic

Panasonic 1090.....	\$219.00
Panasonic 1081.....	\$309.00

SILVER REED

400 Letter Quality.....	\$279.00
500 Letter Quality.....	\$349.00
550 Letter Quality.....	\$469.00
770 Letter Quality.....	\$799.00

TOSHIBA

1340.....	\$769.00
1361.....	\$1299.00

SOFTWARE

PFS (64)

File.....	\$59.99
Report.....	\$59.99

PRECISION SOFTWARE

Superbase 64 w/Audio.....	\$89.99
---------------------------	---------

MARKETPLACE

Paperclip.....	\$59.99
Paperclip w/Spell Pack.....	\$79.99
SpellPak.....	\$39.99
The Consultant.....	\$69.99
Buscard II.....	\$149.99
B.I. 80 Display.....	\$149.99

COMMODORE

C-64 Reference Guide.....	\$18.00
Easy Calc.....	\$59.99
Easy Finance I, II, III, IV.....	\$19.99
Easy Mail.....	\$19.99

CONTINENTAL SOFTWARE (64)

The Home Accountant.....	\$49.99
--------------------------	---------

CBS (64)

Addition & Subtraction.....	\$16.99
Linear Equation.....	\$16.99
Multiplication & Division.....	\$16.99
Quadratic Equations.....	\$16.99

ELECTRONIC ARTS™ (64)

Printal Construction.....	\$29.99
Cut & Paste.....	\$39.99
Hard Hat Mack.....	\$75.99

HES (64)

Games' 84.....	\$19.99
Type 'N' Writer.....	\$19.99
Graphics.....	\$19.99
Cell Defense.....	\$19.99
Hes Writer 64.....	\$22.99

DISKETTES

maxell.

5 1/4 MD-1.....	\$19.99
-----------------	---------

Dennison

5 1/4 Elephant SS/SD EM-1.....	\$15.99
--------------------------------	---------

DESIGNWARE (64)

Crypto Club.....	\$29.99
Trap-a-Zoid.....	\$29.99

INFOCOM (64)

Zork I, II, III.....	\$27.99
Deadline.....	\$29.99
Witness.....	\$49.99

PROFESSIONAL SOFTWARE (64)

Trivia Fever.....	\$29.99
Fleet System II Word Processor.....	\$69.99

SPINNAKER (64)

Snooper Troops 1 or 2.....	\$24.99
Delta Drawing.....	\$29.99
Kids on Keys.....	\$29.99

SUB LOGIC (64)

Flight Simulator II.....	\$39.99
--------------------------	---------

SYNAPSE (64)

Zaxxon.....	\$19.99
Protector II.....	\$19.99
Sentinel.....	\$19.99



COMPUTER MAIL ORDER



TOLL FREE
ORDER LINE

1-800-233-8950

In PA Call: (717) 327-9575

WEST

P.O. Box 6689, Dept. A404
Statenline, NV 89449

EAST

477 E. 3rd St., Dept. A404
Williamsport, PA 17701

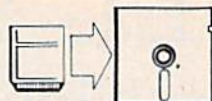
CANADIAN ORDERS

Ontario/Quebec: **1-800-268-3974**
Other Provinces: **1-800-268-4559**
In Toronto: (416) 828-0866 Telex: 06-218960
2805 Dunwin Drive, Unit 3
Mississauga, Ontario, Canada L5L1T1

Order Status Number: (717) 327-9575 Customer Service Number: (717) 327-1450

No risk, no deposit on C.O.D. orders and no waiting period for certified checks or money orders. Add 3% (minimum \$5) shipping and handling on all orders. Larger shipments may require additional charges. NV and PA residents add sales tax. All items subject to availability and price change. Call today for our catalog.

CBUS™



For The
Commodore 64*

CARTRIDGE BACKUP SYSTEM

CBUS I — \$34.95

Lets you copy any cartridge to disk. Many cartridge images can be run from disk (software listings provided) with no changes. Some cartridge images may require modifications.

CBUS I DELUXE

Above with necessary programs on diskette

\$49.95

ORDERS ONLY

(215) 622-0706

TECH INFO.

(215) 622-5495

PLEASE ADD \$3.00 FOR SHIPPING
PA. RESIDENTS ADD 6% SALES TAX
VISA, MC, P.O., CHECKS OR CASH

CBUS II — \$84.95

Will run ANY cartridge image without modification. CBUS II is a true cartridge emulator and will run cartridges with even the heaviest of copy-protection.

CBUS II DELUXE

Above with necessary programs on diskette \$99.95

CBUS COMBO CBUS I & II

With programs on diskette \$119.95

R. J. BRACHMAN ASSOCIATES, INC.

P. O. BOX 1077 • HAVERTOWN, PA. 19083

Even If You Never Prepared a Tax Return Before... MANY HAPPY RETURNS™

Guides the Beginner or Expert C-64* or VIC-20* Owner to Tax Savings

Prepares Individual or Small Business I.R.S. and State Tax Returns



"I Got Many Happy Returns!"

When Mailing Check or Money Order
Please State Machine Type and Memory
OPTIONAL PRINT TO STANDARD I.R.S. FORMS
(FRICTION-FEED PRINTER IS REQUIRED)
Add \$3.00 Shipping and Handling
C.O.D. \$5 Extra FOB Cleveland
3% Surcharge on Credit Card Orders
DEALER INQUIRIES INVITED

A Message from the Program Author:

Taxes are frequently Over-Paid. Regardless of who prepares your tax return... you, a brother, an uncle or spouse... even a professional tax preparer can unintentionally miss a credit, a deduction or choose a method of filing that costs you extra tax dollars.

Using "Many Happy Returns" can mean KNOWING you won't OVER-PAY your tax again! This program uses I.R.S.-approved strategies included in each program I've written since 1978. These strategies combine with the computer to eliminate costly human error and can result in Maximum Tax Savings for you.

Even if you've NEVER prepared a tax return or aren't familiar with computers, with "Many Happy Returns" guidance you can complete your tax return quickly and correctly. As when sitting down with a good professional tax preparer, the program presents a dialog of simple Yes/No questions, then analyzes the answers to determine the correct forms/schedules to file. Previous tax or programming experience is not required.

I feel this program can save you more than its cost, and, it comes with a MONEY-BACK GUARANTEE. You can enjoy KNOWING you paid the least tax this year.

ORDER YOUR COPY TODAY! Thanks and...
MANY HAPPY RETURNS!
Bill Novak

Vertical Horizons, Inc.
2299 West Eleventh Street
Cleveland, Ohio 44113
(216) 696-5093

Pathfinder Edition

Accommodates the needs of most taxpayers. Does 16 forms/schedules/credits including 1040, A, B, D, E, G, W, Child Care Credit, Alimony Payments, Minimum Tax, Marriage Credit, Income Averaging, and Political Contribution Credits. Does all Tax Table calculations (no need to look up tax as required with some programs). Itemized deductions, and more... \$69.95

Pathfinder/Pro Edition

All above PLUS schedules C and SE for small Business, 2106 Employee Business Expense Credits, 2119 Sale/Exchange of Residence Credit. \$99.95

State Tax Edition

Simultaneously performs with above editions to complete NY, CA, or OH State Tax Return. \$14.95

- Designed for Beginner or Expert Users
- Compares filing Joint/Separately
- Swaps dependents to find lowest tax
- Print to screen or I.R.S. forms
- Performs all math calculations
- Normal shipment within 24 hours
- Help a phone call away
- 1/2-Price on Enhanced Annual Updates
- Available for Commodore-64* or 8k-plus VIC-20* on Disc or Cassette
- Other forms/schedules available on request
- Disc Save of Info for Future Use
- Toll-free order hot line
- MONEY-BACK GUARANTEE

COST IS TAX-DEDUCTIBLE

*Trademark of Commodore Business Machines



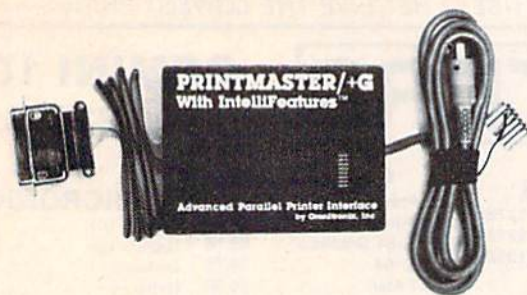
To Order or for More Information

CALL TOLL-FREE

1-800-547-3000

ASK FOR TAX DEPT. C

LIGHT YEARS AHEAD



WE GUARANTEE IT!

We feel that our products are the best on the market, and we are so sure you will think so also that we offer a 30 day money back guarantee.

PRINTMASTER/+G PARALLEL PRINTER INTERFACE with IntelliFeatures™

This is the most advanced printer interface on the market at any price. The Printmaster/+G supports all Commodore printer commands. Prints graphics and graphics characters on all popular printers. Complete switch selection. Transparent, Emulation, Hex, List, and Lock modes. Cassette port powered. Also has external power jack. Prints enhanced graphics. And that's just the start. IntelliFeatures™ give you advanced features found in no other printer interface. Printmaster ROM based routines can load from the Printmaster into the computer. Display the disk directory on the screen without destroying your BASIC program. Machine language terminal software loads in less than 4 seconds. ASCII/Speedscript file conversion. The Printmaster can also operate by itself. Print an ASCII diskfile directly from the disk to the printer without going thru the computer. Also comes with Hi-res screen print and Banner print programs on disk. Optional user installable 16K or 32K printer buffer also contains a ROM which adds many other advanced features such as printing a BASIC program from disk without going through the computer. Disassembles and prints machine language also. Many, many more features. All this and more.

Catalog #10-115 Printmaster/+G Parallel Printer Interface \$119.95
 Catalog #10-116 Printmaster 16K Buffer Expansion \$69.95
 Catalog #10-117 Printmaster 32K Buffer Expansion \$89.95

DELUXE RS232 INTERFACE

The most versatile RS232 interface on the market. Supports full RS232 signal set including Ring Detect. Switch selectable for DTE/DCE, and Busy Line polarity. No other RS232 interface currently offered has all these selections. Easy to use. Good Documentation. Comes with it's own 3 foot cable with either a male or female DB25. Type in BASIC terminal routine, program transfer routine, and more. For Male DB25 order 10-112. Female order 10-113. \$42.95

ALSO FROM OMNITRONIX: CASSETTE INTERFACE
 10-101: Use any cassette with 20/64. Make tape backups \$34.95.
PRINTMASTER/U+G 10-108: Economy parallel printer interface. Connects to the user port. Disk included contains machine language wedge which changes user port to parallel port. Does graphics. \$39.95. **RS232 PRINTER ROUTINES** 10-109: Machine language software. Use RS232 printer with programs not designed for RS232 printer. Many features. \$29.95. **VOLKSMODEM CABLE** 10-103: Connect Volksmodem to a Commodore. No other interface needed. \$22.95.

HOW TO ORDER: See your local dealer or call 206/236-2983 or write to address below. Phone orders ask for \$1.00 discount. Mail/Phone orders add \$2.00 shipping for each product. COD add \$1.90. 30 Day money back guarantee (less shipping). **VISA & MASTERCARD Welcome.** Call, write, or mark the reader service card for a free catalog.

Omnitronix

PO BOX 43 DEPT. G4
 MERCER IS., WA 98040
 206/236-2983 DLRS/DIST CALL



NEW!

Hippo-Phone™

Automatically dial phone numbers with your Commodore!

- Produces Touch-Tone™ and universal dial codes
- Connects directly to phone line (check with your local phone company for direct-connect information).
- Makes any modem into an auto-dial modem. Modem not required.
- On-line directory includes over 1,000 Toll-free 800 numbers and Compuserve™ access phone numbers.
- Software includes LCR (least-cost-routing) program for maximum phone savings according to day and time of call, automatic MCI™ and SPRINT™ dialing, full-screen personal directory editor and dialer, auto-dial and auto-logout program for the Compuserve and Dow Jones networks. Directory of phone area codes and time zone information.
- Many other features.

Let your Commodore do the dialing!

Software on disk and hardware for only:

\$89.00

HIPPOTAMUS
SOFTWARE, INC.

1250 Oakmead Parkway, Suite 210

Sunnyvale, CA 94086

(408) 738-1200

Dealer inquiries welcome. We accept VISA, Mastercard, cashier's checks, money orders, personal checks, and COD orders. California residents add local sales tax. Please include \$5 for shipping and handling. Please allow 1-2 weeks for delivery. Hippo-Phone is a trademark of Hippopotamus Software, Inc. Price, availability, and specifications subject to change without notice.

An integrated business software package for the C-64™ for \$1.59 a Program? Yes.

The Intelligent Software Package for C-64™, VIC™, SX-64™, Plus 4™, 16™, 'B'-Series™, and PET/CBM™. No games, no fancy packaging, and you can't buy it anywhere but here. But: 22 powerful, useful programs that will put your Commodore to work right now, in your home or office; all on one disk at the ridiculous price of \$35. Includes:

Database: A complete multi-keyed fixed-record-length data base manager. Sort or select (using all relational operators: =, >, <, AND, OR, NOT, wild card) on any field, perform computations on numeric fields. Any operation can be performed on all, or only selected records. All fields completely user-definable. Can be used for any number of tasks, including accounting, mailing lists, inventory control, record, tape, or book cataloging, expense account maintenance, or as an electronic rolodex. Even if you use your Commodore for nothing else, this program alone might justify its expense.

Word Processor: The original word processor for the VIC-20, W/P is now available for all CBM models. A full-featured menu-driven word processor including very fast file commands (including a disk catalog), screen editing, text locating and full control over margins, spacing, paging, indentation, and justification. "... well done and highly functional... Provides an excellent alternative to the high priced word processors... this is an excellent buy. Highly recommended." — Midnite Software Gazette. "Provides good basic features." — Compute's Gazette.

Copycalc: An electronic spreadsheet. Turns your Commodore into a visible balance sheet; includes screen editor. "Excellent program for budgeting, estimating, or any math-oriented use... well worth the money. Highly recommended." — Midnite Software Gazette.

Also Included: ReportGen, ReportMerge (interface W/P with Database to create form letters, statements, invoices, mailing labels, other reports.); **Baseball Statistician** (compiles batting statistics for a baseball league); several W/P's text files; several Database utilities, including **DBmerge** (facilitates multi-file database applications.); **AND DBStat** (analyzes D/B files); a programming utility, **ASCII**, which converts text files (program listings) into program files; also **Checkbook; Inventory; Paper Route; Loan Analysis; Breakeven Analysis; Depreciation; Labeler**; more.

Versions of the package are available for any and every Commodore computer having a minimum of 10k RAM (does it say 'Commodore' on it? How about on the box it came in? Add \$3 if you have an 8050 disk drive. All programs will fully support tape, disk, and printer. The package is available only on disk; however, you may order any two programs on cassette for \$20. Price includes documentation and shipping within USA and Canada; all other countries, add \$5 (no personal checks from outside USA). No charge cards. For C.O.D., enclose \$5 fee; Calif. residents add 6%. This ad is the catalog.

Intelligent Software
Quality Software since 1982

Box A Dept. G
San Anselmo, CA 94960

MICRO-SYS DISTRIBUTORS.

commodore

SOFTWARE FOR C-64

Business	
Multiplan (Spreadsheet)	\$ 63.00
Calc Result (Advanced)	\$ 79.95
Superbase 64	\$ 75.00
Mirage Concepts (Data Base)	\$ 89.00
Mirage Concepts (Word Processor) (40/80 column & 30K Dictionary)	\$ 89.00
B.I. Paperclip W/Spellpac (W/P)	\$ 85.00
Home Accountant (Continental)	\$ 45.00
Tax Advantage (Continental)	\$ 35.00
Info Designs G/L	\$ 19.95
Southern Solutions Accounting G/L, A/R, A/P, P/R, I/M	\$ 49.95
Tri Micro Accounting C64 & Plus 4 G/L, A/R, A/P, P/R, I/M	\$ 49.95
Smart64 Term + 3	\$ 39.95
Hellcat Ace (game)	\$ 25.00
Solo Flight (game)	\$ 25.00

Utilities	
Printer Utility Program (Cardco)	\$ 19.95
Disk Utility Program (Fast copy, File copy, Disassembler, For 1541)	\$ 49.95
Bits and Pieces (Backup & Utility, Screen Dump & More for MSD Drive)	\$ 49.95
Simon's Basic	\$ 39.95
80 Column Expander (Cartridge)	\$ 60.00
64 Relay Cartridge	\$ 45.00
Oxford Pascal	\$ 69.95
Tool 64 (Handic)	\$ 39.95
Graf 64 (Handic)	\$ 39.95
Stat 64 (Handic)	\$ 39.95
Forth 64 (Handic)	\$ 39.95

ACCESSORIES

MSD Super Disk Drive (single)	\$ 349.00
MSD Super Disk Drive (dual)	\$ 575.00
Hayes Smart 300 Modem	\$ 229.00
Vic 1530 Datasette	\$ 65.00
Cardco Datasette	\$ 55.00
Cardco Numeric Key Pad	\$ 39.95
Alien Voice Box	\$ 95.00
When I'm 64 (Voice Box Sings)	\$ 25.00
Voice Box Dictionary	\$ 25.00

B.I. 80 Column Display	\$ 159.95
1541/Flash	\$ 89.95
Seck It To Me (For 8032)	\$ 29.00
6420 Westridge Modem (Auto Answer/Auto Dial)	\$ 89.95
Telearning (Auto Answer/Auto Dial) Modem With software	\$ 95.00
CBM 4023 Ribbons	\$ 10.95
CBM 1526 Ribbons	\$ 10.95
CBM 8023P Ribbons	\$ 8.75
CBM 6400 Ribbons	\$ 8.75
LQ1 Ribbons	\$ 8.75
Diablo Daisy Wheel	\$ 13.95
Abati Daisy Wheel	\$ 13.95
Flip N' File 10, 15, 25, 50	Call
Power Strips (Surge Protector)	\$ 49.95
Computer Glow Care Kit	\$ 10.95
Disk Drive Cleaning Kit	\$ 10.95

MONITORS

Panasonic TR120 (Amber) For Apple or IBM Computers	\$ 156.00
Green & Amber (For Apple & IBM)	\$ 85.00
RGB Monitor Cable: ET-101C (Apple)	\$ 33.80

INTERFACES

BussCard II (Batteries Included) IEEE, Cartridge Slot, Basic 4.0	\$ 159.95
BussCard Printer Cable	\$ 29.95
SuperBox 64 (Handic) IEEE, Reset, 3-Slot	\$ 139.95
Interpod (Intelligent IEEE & RS-232)	\$ 139.95
Cardco +G Parallel Interface	\$ 79.95
Cardco B Parallel Interface	\$ 49.95
The Connection (by Tymac) (Commodore Graphics + 2K Buffer) Epson, Gemini, Okidata, Panasonic	\$ 95.00
Turbo/GT (Telesys) With optional 16K or 32K Buffer	\$ 89.95
Vic Switch (Handic)	\$ 149.95
ADA1800 IEEE to Centronics	\$ 149.95
Pet to IEEE Cable	\$ 39.00
IEEE to IEEE Cable	\$ 49.00
Networking For C-64 & CBM	Call

LETTER QUALITY PRINTERS

Abati (20 CPS) W/Interface	\$ 475.00
----------------------------------	-----------

DOT MATRIX PRINTERS

Smith Corona Fastex 80 (80 CPS)	\$ 259.00
Smith Corona 100 (120 CPS)	\$ 315.00
Smith Corona 200 (140 CPS)	\$ 456.00
Smith Corona 300 (140 CPS, 15in)	\$ 589.00

BUSINESS SOFTWARE — B128

Superscript II (40K Dictionary)	\$ 199.00
Superbase (Data Base)	\$ 199.00
Calc Result	\$ 199.00
Complete Accounting System From Software Design (G/L, A/R, A/P, P/R, I/M)	\$ 375.00

BUSINESS SOFTWARE — 8032/8096

WordPro 4+ or 5+	\$ 225.00
Calc Result	\$ 199.95
SuperBase (8096 only)	\$ 225.00
Complete Accounting System From Software Design (G/L, A/R, A/P, P/R, I/M)	\$ 375.00

TERMS

Orders under 50.00 add 10.00 Handling fee
MasterCard, VISA, Money Order, Bank Check
COD (add 5.00)
Add 3% For Credit Cards

All Products In Stock Shipped Within 24 Hours

F.O.B. Dallas, Texas
All Products Shipped With Manufacturers
90 Day Warranty

PRICES ARE SUBJECT TO
CHANGE WITHOUT NOTICE.

AUTHORIZED WHOLESALE DISTRIBUTOR FOR ALL COMMODORE BUSINESS MACHINE PRODUCTS.

BECOME A COMMODORE DEALER. AND SEE WHY IT'S THE BEST DEAL IN NEW COMPUTER PRODUCTS.

FOR PRODUCT CATALOG & PRICE LIST WRITE OR CALL MICRO-SYS DISTRIBUTORS.

ORDERS ONLY CALL
1-800-527-1738

INQUIRIES & INFORMATION PLEASE CALL
1-214-231-2645

Micro-Sys

D I S T R I B U T O R S

641 Presidential Drive • Richardson, Texas 75081 • 9:30 a.m.-6:30 p.m. (Mon.-Fri.) • 10:30 a.m.-2:30 p.m. (Sat.)

FAST DELIVERY

Call Us For
Fast Service, Experience
and Affordable Prices

Software

HOLIDAY SPECIAL



SUBLOGIC
Flight Simulator
\$31.95

MICROPROSE
Solo Flight
\$21.95

F-15 EAGLE
\$21.95

INFOCOM

Zork I, II, III... ea.	\$25
Suspended	\$25
Starcross	\$25
Deadline	\$25
Sea Stalker	\$25

WORD PROCESSING

Special of the Month

PAPERCLIP
with SPELLER **\$59**

Easy Script	\$45
Word Pro 64 & Speller	\$58
EZ Spell	\$17

PROGRAMMING SERIES

Assembler 64	\$36
Logo	\$52

Simon Basic

Simon Basic	\$29
Borland Pascal	\$42
Nevada Fortran	\$39
Nevada Cobol	\$39

ACCOUNTING

Home Accountant	\$44
Tax Advantage	\$45
General Ledger	\$35
A/R, A/P, Payroll	\$35
The Manager	\$35

DATA BASES

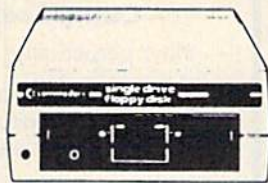
Code Writer	\$64
Mirage Database Mgr.	\$79
Super Base 64	\$54

Special of the Month
The Consultant
\$59.00

SPREAD SHEET

Multiplan	\$63
Practicalc	\$38

Hardware



1541 \$Call

Special of the Month
MSD DISK DRIVE
SD1 Disk Drive **\$244**
SD2 Disk Drive **\$444**

Introductory Offer
INDUS GT
DISK DRIVE
\$CALLS

ELEPHANT DISK
SS/SD \$15.50 SS/DD \$16.50
Verbatim, Datalife

NEW.....FAST
1660 MODEM
\$84

SX-64 Computer

1702 Monitor
\$CALL
ZENITH MONITORS
122 Amber

COMPUTER COVERS

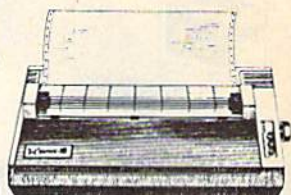


Reg. \$15.95 **\$6.99**

CMD 64	\$6.99
VIC 20	\$6.99
Disk Drive	\$6.99
Espon MX 80	\$7.99
Espon MX 80 FT	\$7.99
Okidata 92	\$7.99

Printers

GEMINI 10X
\$219



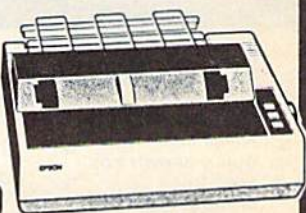
15X..... **\$339**

Number one selling dot matrix printer, Gemini 10X, prints 120 cps bi-directionally, with logic-seeking printerhead control. There's both friction and tractor paper feed. Prints high resolution graphics.

Letter Quality Powertype **\$325**

NEW SG-10, SG-15, SR-10, SR-15 IN STOCK, CALL FOR PRICES

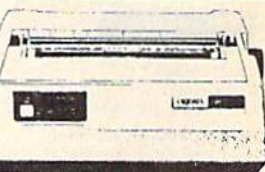
EPSON RX80
\$228



RX80 FT

The most compatible dot matrix printer, prints 100 cps, bi-directionally. Call for RX-100, FX-80 and FX-100 prices.

OKIDATA 182
\$249



OKIDATA 92

Special Offer

MW-350..... **\$69**
4K Buffer

Juki 6100

Silver Reed 400 ... **\$249**
Silver Reed 500 ... **\$379**

PRINTER INTERFACES

Micrografix MW350	\$69
Tymac Connection	\$79
Cardco + G Interface	\$66
Cardco B Interface	\$39
Grappler CD	\$102

SURGE PROTECTORS

1 Outlet	\$14
4 Outlet	\$38
6 Outlet	\$69
6 Outlet & Noise Filter	\$88

Ordering & Payment Policy

Prices reflect a cash discount. For Visa, and MasterCard add 3% Immediate delivery with certified check or wired funds. N.J. resident add 6%. Prices subject to change.

Shipping

For shipping and handling add 3%. (\$3 minimum)
Larger shipments require additional charge. C.O.D. add \$3.50

PANASONIC

1090

Printer Specials

Doodle

FOR INFORMATION CALL (609) 596-1944

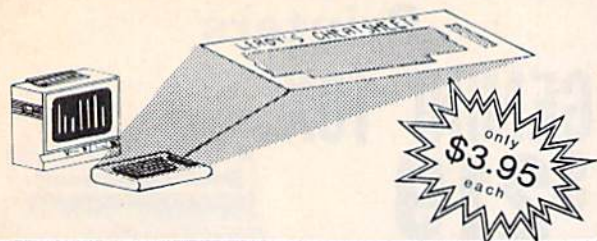
ORDER TOLL FREE (800) 992-3300

PC GALLERY

P.O. Box 3354
Cherry Hill, N.J. 08034

LEROY'S CHEATSHEET®

KEYBOARD OVERLAYS



FOR COMMODORE 64

(VIC-20 also available)

LEROY'S CHEATSHEETS® are plastic laminated keyboard overlays designed for use with popular software and hardware for Commodore's VIC-20 & C-64 computers.

These cut-it-out yourself overlays are designed to fit over the keyboard surrounding the keys with commands and controls grouped together for easy references.

LEROY'S CHEATSHEETS™

make life easier for you

WORD PROCESSORS

- EASY SCRIPT¹
- HES WRITER
- PAPER CLIP
- QUICK BROWN FOX
- SCRIPT 64
- SPEEDSCRIPT (GAZETTE)
- WORDPRO 3/PLUS

MISCELLANEOUS

- BLANKS (3 ea-NOT laminated)
- FOR THE BEGINNER
- SPRITES ONLY
- FLIGHT SIMULATOR II
- DOODLE
- DISK 1541 (CBM)

LANGUAGES & UTILITIES

- BASIC
- HESMON 64
- LOGO (CBM-sheet 1)¹
- LOGO (CBM-sheet 2)¹
- PILOT (CBM)¹
- COMAL .14 (DISK)
- SIMON'S BASIC

SPREADSHEETS

- CALC RESULT (ADVANCED)
- CALC RESULT (EASY)
- EASY CALC¹
- MULTIPLAN (HES/MICROSOFT)
- PRACTICALC 64 (OR PLUS)

DATA BASES

- THE CONSULTANT (Delphi's Oracle)
- MANAGER (CBM)¹
- SUPER BASE 64

TERMINALS

- TERM 64
- THE SMART 64 Terminal
- VIDTEX
- VIP TERMINAL

PRINTERS

- COMMODORE 1525, MPS-801
- COMMODORE 1526¹
- EPSON RX-80
- GEMINI 10X
- OKIDATA 92/93

GAZ

Qty. ___ X \$3.95 \$ _____

Shipping & handling \$ 1.00

6% sales tax \$ _____
(PA residents only)

TOTAL \$ _____
U.S. FUNDS

Dealer inquiries welcome

Name _____

Address _____

City _____ State _____ Zip _____

(L) Products of Commodore Business Machines

CHEATSHEET PRODUCTS™

P.O. Box 111368 Pittsburgh PA. 15238



(412) 781-1551

... OR SEE YOUR LOCAL DEALER !

Finally . . .

INTELLIGENT MUSIC SOFTWARE

. . . For the Commodore 64

ALGO-RHYTHM SOFTWARE proudly presents:

CANTUS™, The Music Improviser

—Composes its own music!—

- Plays perpetually; always new; never repeats.
- Listen to music change as you alter parameters with the full screen editor. Or, experiment with any of more than 50 pre-set styles provided.
- Real-time display of notes played.
- You control: Harmony, rhythm, tempo, range, counterpoint, etc.
- You control C-64 sound: ADSR, filter, waveform, vibrato, modulation, etc.
- 36 page comprehensive user's manual (with glossary).



Created by Michael Riesman, musical director of the Philip Glass Ensemble, Cantus will transfix you with its beautiful and exciting inventions! No more tedious typing in of notes! No more rinky-dink!

ALGO-RHYTHM SOFTWARE

176 Mineola Blvd.
Mineola, New York 11501

DISK
\$54
+ \$2 Handling
Check or M.O.

ORDER TOLL-FREE: 1-800-645-4441
IN NY CALL: 516-294-7590

FREE 10 DISKETTES OR 20 C-20 CASSETTES

A subscription to the 'Cassette of the Month' gets you a tape or disk full of 10 quality Commodore 64 programs delivered to you by first class mail every month. The documentation included will help you run great utilities like 'Word Processor,' and 'Budget Analyzer,' or enjoy great games like 'Frogjump' and 'Caterpillar Cave' **FOR AS LITTLE AS 50 CENTS EACH!**

★ Limited offer ★ Subscribe for a year on cassette and receive **20 Free C-20 cassettes** or subscribe for a year on disk and receive **10 Free 5¼ single sided double density diskettes!**

PRICES

	TAPE	DISK
1YR (12 ISSUES)	60 ⁰⁰	75 ⁰⁰
6MO (6 ISSUES)	35 ⁰⁰	45 ⁰⁰
Single Copies	7 ⁰⁰	9 ⁰⁰



- ★ We've been in business for over three years! acquiring
- ★ Over 4000 satisfied color computer owners
- ★ Commodore 64 required

Mich. Res. add 4%
Overseas ADD \$10 to subscription and \$1.00 to single issues.

PERSONAL CHECKS WELCOME!

T & D Subscription Software
P.O. BOX 256-C
HOLLAND, MI 49423
(616) 396-7577



ATTENTION

ALL COMMODORE 64, VIC 20, COMMODORE 16, AND PET OWNERS

A complete self-tutoring BASIC programming course is now available. This course starts with turning your computer on, to programming just about anything you want! This course is currently used in both High School and Adult Evening Education classes and has also formed the basis of teacher literacy programs. Written by a teacher, who after having taught the course several times, has put together one of the finest programming courses available today. This complete 14 lesson course of over 230 pages is now available for the COMMODORE 64, VIC 20, COMMODORE 16 and PET computers and takes you step by step through a discovery approach to programming and you can do it all in your leisure time! The lessons are filled with examples and easy to understand explanations as well as many programs for you to make up. At the end of each lesson is a test of the information presented. Furthermore, ALL answers are supplied to all the questions and programs, including the answers to the tests. Follow this course step by step, lesson by lesson, and turn yourself into a real programmer! You won't be disappointed!

We will send this COMPLETE course to you at once for just \$19.95 plus \$3.00 for shipping and handling (U.S. residents, please pay in U.S. funds). If you are not COMPLETELY satisfied, then simply return the course within 10 days of receipt for a FULL refund.

Fill in the coupon or send a facsimile.

NAME: _____	CG
ADDRESS: _____	
CITY: _____	
PROV./STATE: _____	
POSTAL/ZIP CODE: _____	
Check desired course:	COMMODORE 64 <input type="checkbox"/>
	VIC <input type="checkbox"/> PET <input type="checkbox"/>
	COMMODORE 16 <input type="checkbox"/>
Send Cheque or Money Order to:	
Brantford Educational Services	
68 Winding Way,	Complete course: \$19.95
Brantford, Ontario,	Postage and hand.: \$3.00
Canada, N3R 3S3	Total: \$22.95

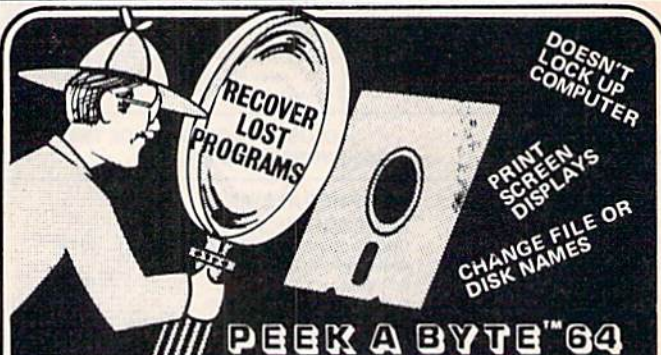
Better Than Original Equipment



This CP Power Supply for the Commodore 64 and VIC-20 is definitely better and more reliable than the one that originally came with your computer. It works dependably, year-in and year-out. Unlike the others, this CP Power Supply is serviceable, NOT disposable.

Computer Place (213) 325-4754
23914 Crenshaw Blvd. Torrance, CA 90505
Dealer Inquiries Welcome

Commodore 64 and VIC-20 are trademarks of Commodore Business Machines, Inc.



A DISK AND MEMORY EDITOR

Peek A Byte is more than a disk editor - it features a C-64 memory display in HEX, ASCII, or screen code and a full page editor with cursor control.

YOU CAN PEEK A BYTE...

Change file or disk names, recover "lost" programs, compare disk data, display free sector map, convert HEX/decimal, read disk drive memory, disassemble disk or memory data, print most screen displays... and much more!

IT'S EASY TO USE!

All commands are simple, easy to remember keystrokes and HELP screens are always available. Complete error handling for key entries and disk read/write errors. Tutorial manual for beginners and pros!

PEEK A BYTE IS FAST ML CODE

Above BASIC and compatible with many BASIC programs, ML routines, and the DOS Wedge 5.1. Doesn't "lock up" the computer.

QUANTUM SOFTWARE

P.O. Box 12716, Dept. 4
Lake Park, Florida 33403

ALL FOR **\$29.95**
US POST PAID

PEEK A BYTE is a trademark of Quantum Software.

To order send check or money order, US funds. Foreign add \$4 for shipping and handling. Florida residents add 5% sales tax. For US COD orders add \$2. Phone orders call (305) 840-0249.

DEMO PROGRAM

See *COMPUTE!'s GAZETTE* February, 1985 Disk

WHAT IS THIS GIRL DOING?

THE GIRL IS
 TH AX PAS GG3 ER2 LL PAS IH SS
 29 15 04 34 52 45 04 12 55
 FEEDING
 PAS FF IY PA3 002 IH NG PAS BB1
 04 40 19 02 33 12 44 04 28
 BREAD TO
 RR1 EH EH PA1 001 PAS TT2 UW2
 14 07 07 00 21 04 13 31
 A DUCK
 PAS EY PAS 002 AA KK2 PAS
 04 20 04 33 24 41 04



You can now have your computer speak to you... with the inevitable "Kilobaud Monster." This remarkable breakthrough in engineering is now being offered to the general public by Computel, and is made possible at a fraction of the cost you'd expect to pay anywhere else. You will also learn how computers speak, what speech synthesis is, and the basics behind phonemics. It's a great educational tool for the individual and for the institution alike!

The Kilobaud Monster is a revolutionary item for the hobbyist, because now you can have many new resources available for experimentation. No longer is this field of science limited to the lab, and no longer is its cost limited to governmental research projects. You can make your computer speak with little effort, a lot easier than you think!

The quality of speech pronunciation is excellent. Anything imaginable may be spoken, from scientific thru slang words—we include detailed instructions showing you exactly how to do this. You can now have all the satisfaction of doing this yourself, at a fraction of the cost, and having something really useful to show for your efforts!

*Devant
si je Puis*

KILOBAUD MONSTER

ONLY \$995
regular price *

Introductory package includes everything you need to get started!
* SAVE—Computel members only \$ 7.95.



YOUR COMPUTER WILL TELL YOU! DON'T THEY ALL NOW "SPEAK?"...

- Able to work with any computer!
- Complete instructions included!
- User-programmable vocabulary of virtually unlimited size!
- Program it to say anything you want!
- Guaranteed to hold your interest and delight for hours!

The Kilobaud Monster is the basis of a series of projects that can make your computer talk, and is necessary for later projects. The Kilobaud Monster will set you up with everything you need to know in order to attach it to your computer and enable it to speak words. All additional information is included with this beginner's package. The built-in editor in the Wordmaker enables you to easily "fine tune" every word you create to make it sound exactly as you wish. Or you can set up a "word bank" with the Message Talker that includes all the phrases and statements that you'll ever need! The Artificial Intelligence accessory will permit your computer to produce totally random sentences, following all the rules of correct grammar within a pre-defined vocabulary-set, all day long!

If you're new to the computer field, or if you're an old-time "hacker," you'll want to subscribe to our publication "Computel," which covers everything that YOU want to see! Encompassing the subjects of Computers, Electronics, and Telecommunications, this publication gives you a "new meaning" of the free enterprise system and the monopoly of existing organizations. You'll need to become part of this international hobbyist phenomenon really soon. SAVE \$2.00 on EACH ITEM you buy if you subscribe to Computel now! And this is IN ADDITION to the total package price for the Complete KILBAUD MONSTER Collection—you'll SAVE OVER \$18. Dealer and educational institution inquiries invited. Circle our Reader Service Number for additional information.

You may order these products from us by sending a check, money order, postage or cash in U.S. negotiable funds only, to the address indicated below. Or you may charge your order to your Visa or MasterCard. Please include \$2.00 shipping and handling on all orders. California residents please add sales tax. Allow three weeks for delivery. Add \$5.00 for next-day shipment by U.P.S.; \$15.00 for next-day delivery by U.S.P.S. We guarantee your satisfaction for 90 days with our products, and offer a money-back guarantee if not fully satisfied during that period.

COMPUTEL PUBLISHING SOCIETY
6354 VAN NUYS BLVD., SUITE 161 / VAN NUYS, CA 91401-2696

YES, I'm interested in making my computer talk. Please send me the following items:

- INTRODUCTORY PACKAGE \$ 9.95
- WORDMAKER \$ 19.95
- MESSAGE TALKER \$ 14.95
- ARTIFICIAL INTELLIGENCE \$ 24.95
- COMPLETE COLLECTION SET (SAVE \$10) \$ 59.50
- One year subscription to Computel.. \$ 14.00
- including all Kilobaud Monster items \$ 65.50

PLEASE ADD \$2.00 SHIPPING & HANDLING TO YOUR ORDER. G1

CREDIT CARD _____ EXP. DATE _____

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

Your Computer _____
SEND ALL PAYMENT IN U.S. FUNDS DRAWN ON U.S. BANKS • SORRY, NO C.O.D.'S
Make checks payable to: **COMPUTEL PUBLISHING SOCIETY**
Post Office Drawer 7765 / VAN NUYS, CA 91409-7765

C-64 MUSIC DISKS

- * Want to experience the power of the SID chip?
- * Tired of laser guns and space ships?
- * Want authentic background music for your adventure games?
- * All our music is programmed in 100% machine language by a professional musician.
- * Informative music-historical notes are built into each program.
- * Additional titles in preparation!

Titles Now Available:

1. An Elizabethan Concert . . . \$14.95
2. A J.S. Bach Recital 14.95
3. A Baroque Recital 14.95
4. Lute Music of Olden Times . . 14.95
5. Sampler (includes selections from above titles, plus more) . . . 12.95

DISK ONLY

Payment in U.S. funds only! Add \$2.00 per order for shipping and handling. Orders shipped via speedy UPS whenever possible!

ANTIGUA SOFTWARE
P.O. Box 5386
Lake Station, IN
46405-9998

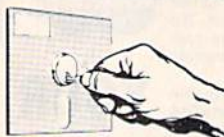


STOP SOFTWARE PIRACY

Using Safeguard 64 Disks

- Renders Bit and Nibbler Copiers Ineffective
- Software is Encrypted and Protected on Each Disk
- For Commodore 64

Why should your valuable data or useful software program become available in the Public Domain?



Call or write for more information.

GLENCO ENGINEERING INC.
3920 Ridge / Arlington Hts., IL 60004
(312) 392-2492

Easy Guitar

Learn to play guitar on your Commodore 64 Computer

Now you can enjoy learning at your own pace, on your own time. EASY GUITAR puts you in tune with today's music. Here are just a few of the fun and educational features you'll find in EASY GUITAR:

- Simple to follow, step-by-step instructions
- Reference tones for tuning your guitar
- An exercise to develop your sense of pitch
- A built-in rhythm section (bass and drums) for you to play along with
- More than 50 chord diagrams with fingering positions colorfully displayed
- Audio guidance so you know if you are playing correctly
- An adjustable metronome for developing solid rhythm
- A simplified approach to music theory and chord structure to aid you in playing and writing your own songs
- Scales to develop rapid fingering
- A multiple choice quiz (because learning can't be all fun)
- Plus a special bonus: a video game called "Catch a Chord"

\$29.95 on disk

plus \$1.00 shipping & handling

VISA & MC Accepted or send check or money order to:



10636 Main St., #414 • Bellevue, WA 98004 • (206) 883-9257

TAPE USERS

MAJOR BREAKTHROUGH

Buzzy BUZZARD'S C-64 Tela Tape Term

\$29.95

At last, an efficient term program for your dataset and modem.

Download and upload all types of programs. Basic and Machine language.

•GAMES••UTILITIES••EDUCATIONAL•

Download and upload tape to tape or disk to tape

TO ORDER SEND CHECK OR MONEY ORDER.

FOR COD AND CREDIT CARD ORDERS

Call 1-904-384-6652

SYSP'S INVITED TO INQUIRE ABOUT A SEND SUBROUTINE

TELASOFT

2144 Blanding Blvd.

Jacksonville, Florida 32210

C-64 TRADEMARK OF

COMMODORE BUSINESS MACHINES

BLACKJACK SYSTEM TESTER

Find out if your system is really a winner before spending time learning or risking your bankroll. Pick the best system from among alternatives.

Define the system you want to test by responding to questions and filling in blanks. Let the system run for an indefinite period. In a one-day run you can run 10 million or more trials. One-page printed (or screen display) analysis clearly indicates best levels for increasing bets and for insuring.

You control:

- No. of Players (1-3)
- No. of Decks (1-4)
- Double, Surrender, Double-After-Split Options
- Hard-Stand, Soft-Stand, Hard-Double, Soft-Double, Split, Surrender Criteria
- Reshuffle Point

Commodore 64™ — Cassette Only — \$39.95. Check, Money Order, C.O.D. (Add \$3). VISA or MC. Include Name, Card Number, Exp. Date. Idaho Res. Add 4% Sales Tax.

NOVO SOFTWARE

Box 6423, Boise, ID 83707

(208) 375-7435

WE WON'T PAY YOUR TAXES!

But **TAX MASTER** will help you compute them more QUICKLY and EASILY.

Be the Master of your Income Taxes with

TAX MASTER

now available for your 1984 Federal Income Taxes for the Commodore 64 with single, twin, or dual disk drive and optional printer.

Features of **TAX MASTER**:

- **GUIDES** you in the **PROPER ORDER** through forms 1040, 4562 & Sched. A,B,C,D,E, and F.
- **PERFORMS ALL** arithmetic. **CORRECTLY!** You enter only the original data.
- **EASY CHANGE** of any entry, with instant **RECALCULATION** of the entire form.
- **TRANSFERS** numbers between forms.
- **CALCULATES** your taxes and **REFUND**. (Tax tables are included!)
- **SAVES** all your data to disk for future changes, re-use, or reference.
- **PRINTS** the data from each form.
- **MULTIPLE SCHEDULES** (for more than one business, farm, etc.) are supported.
- Data from **MANY DIFFERENT TAX RETURNS** may be stored on the same disk.

TAX MASTER (DISK ONLY) ONLY \$24.00

If you don't need all the schedules, get

TAX MASTER JR

- For VIC-20 with 24K expansion or Commodore 64, disk or tape.
- Form 1040, Schedules A and B.
- Disk or tape data storage & retrieval.

TAX MASTER JR ONLY \$19.00
SPECIFY DISK OR TAPE

INCLUDED WITH EACH PROGRAM:

- **COMPLETE INSTRUCTION MANUAL.**
- **DISCOUNT COUPON TOWARD THE PURCHASE OF NEXT YEAR'S UPDATED PROGRAMS**

Cost of these programs is **TAX DEDUCTIBLE.**

Add \$2.00 per order shipping & handling

Maryland residents add 5% sales tax

Send check or money order to:

MASTER SOFTWARE

6 Hillery Court

Randalistown, MD 21133

ADVERTISERS INDEX

Reader Service Number/Advertiser	Page	Reader Service Number/Advertiser	Page	Reader Service Number/Advertiser	Page
102 AA Computer Exchange	159	130 DJ Software	158	Schnedler Systems	159
103 Abacus Software	47	131 Dream Dog Software	146	161 Skyles Electric Works	95
104 Abacus Software	79	132 Eastern House	89	Slide Mountain Systems	146
105 Abacus Software	160	133 Full Circle Software, Inc.	77	162 Software Design, Inc.	47
106 Abby's Discount Software	155	Future Age Computers	146	163 Software Discounters of America	152
107 Access Software Incorporated	53	134 Genie Software	93	164 Software Publishers Assoc.	44,45
A.I.D. Corp.	115	135 Glenco Engineering Inc	158	165 Starpoint Software	41
Algo-Rhythm Software	154	136 Hippopotamus Software, Inc.	150	166 Strategic Simulations, Inc.	51
Antiqua Software	158	137 Indus Systems	39	167 SubLOGIC Corporation	19
Apropos Technology	57	138 Inforunner	IFC,1	168 T & D Subscription Software	154
108 Artificial Intelligence Research Group	152	Intelligent Software	150	169 Telasoft	158
		Jason-Ranheim	115	170 TeleLearning Systems, Inc.	61
109 Basix	35	139 JV Circuits	113	171 Timeworks, Inc.	9
110 Basix	63	140 Kyan Software	18	172 Triad Computers	159
Batteries Included	23	141 Lyco Computer Marketing & Consultants	149	173 Tussey Mt. Software	109
111 Baudville	11	Master Software	158	Ultrabyte	78
112 Big Bytes	112	142 Megasoft	68,69	174 Uni-Kool	93
113 Bill Cafarelli	146	143 Microbits Peripheral Products, Inc.	13	Vertical Horizons, Inc.	148
114 Blackship Computer Supply	146	Micro-Sys Distributors	151		
Brantford Educational Services	156	144 Micro-W Distributing, Inc.	115		
115 Bytes & Pieces, Inc.	159	145 Micro-W Distributing, Inc.	41		
116 Cardco, Inc.	IBC	146 Mimic Systems Inc.	27		
117 CDI/Computer Devices International	37	147 Mindscape, Inc.	31		
Cardinal Software	93	148 NewArts Co.	56		
118 Central Point Software, Inc.	88	149 Novo Software	158		
119 Cheatsheet Products	154	Nth Digit Solutions	146		
120 Columbia Software	152	150 Omnitrionix	150		
Commodore	BC	151 Orange Micro Inc.	29		
121 CompuServe	15	152 Pacific Exchanges	146		
122 ComputAbility	73	153 Parsec Research	66		
123 Computel	157	154 PC Gallery	153		
Computer Centers of America	91	155 Playnet, Inc.	25		
124 Computer Mail Order	147	156 Professional Software, Inc.	7		
Computer Place	156	Pro-Line Software	56		
125 Creative Software	2	157 Protecto Enterprises	80-85		
126 CSM Software, Inc.	93	158 Quantum Software	156		
127 Custom Programming Group, Inc.	89	159 R. J. Brachman Associates, Inc.	148		
128 Davidson & Associates, Inc.	55	160 Scarborough Systems, Inc.	5		
129 DES-Productions	146				

COMPUTE!'s All About the Commodore
 64, Volumes One and Two 65
 COMPUTE!'s Commodore Collection,
 Volumes One and Two 33
 COMPUTE!'s Gazette Disk 48,49
 COMPUTE!'s Gazette Language 17
 COMPUTE!'s Machine Language and
 Second Book of Machine Language 71
 COMPUTE!'s Programming the VIC... 59

VIDEO BASIC-64 — add 50+ graphic and sound commands to your programs with this super development package. You can distribute free RUNTIME version without paying royalties! **\$59.95**

BASIC COMPILER-64 — compiles the complete BASIC language into either fast 6510 machine language and/or compact speedcode. Get your programs into high gear and protect them by compiling. **\$39.95**

MASTER-64 — professional development package for serious applicants. Indexed file system, full screen management, programmer's aid, BASIC extensions, 100 commands. **\$39.95**

PASCAL-64 — full Pascal with extensions for graphics, sprites, file management, more. Compiles to 6510 machine code and can link to Assembler/Monitor routines. **\$39.95**

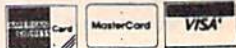
ADA TRAINING COURSE — teaches you the language of the future. Comprehensive subset of the language, editor, syntax checker/compiler, assembler, disassembler. 120+ page guide. **\$59.95**

FORTRAN-64 — based on Fortran 77. Common, Data, Dimension, Equivalence, External, Implicit, Goto, Else If, Do, Continue, Stop, Subroutine, Call, Write, Read, Format, more. April 1985 **\$39.95**

C-LANGUAGE COMPILER — a full C language compiler. Conforms to the Kernighan & Ritchie standard, but without bit fields. Package includes editor, compiler and linker. April 1985 **\$79.95**

Other titles available: Write or call: PHONE: (616) 241-5510

For postage and handling include \$4.00 (\$8.00 foreign) per order. Money order and checks in U.S. dollars only. Mastercard, VISA and American Express accepted. Michigan residents incl 4% sales tax.



Abacus Software
 P.O. Box 7211 Grand Rapids, MI 49510

Break
 the
BASIC
UNIQUE
 language
 barrier

"The Complete CARDCO Line" ... and still growing!

CARDCO provides "Commodore-ready" computer accessories that will enhance your utilization of Commodore-64 and VIC-20 Computers, increase their capability, and add to your enjoyment and skill. AND, they're available for use with other personal computers, too.

Designed with the user in mind, CARDCO offers fine accessories including Printer Interfaces with and without graphics, Expansion Interfaces, Memory Expansions, Cassette Interfaces, Numeric Keypads PLUS "NOW" Software for your VIC-20 and C-64. These programs include the "WRITE NOW" Word Processor, "MAIL NOW" Mailing List, PRINTER UTILITY PROGRAMS on Tape and on Disk, "SPELL NOW" Spell Checker, "GRAPH NOW" including "PAINT NOW", and "FILE NOW".

CARDCO has three new Letter Quality PRINTERS with your choice of drumhead design (8 1/2" carriage), Daisy Wheel Design (13 inch carriage) and Daisy

Wheel Design (11 inch carriage). "Commodore-ready" ... plus, with compatible input for PC, PC jr., TRS-80 and many more personal computers. CARDCO's NEW "DATA CASSETTE RECORDER/PLAYER" is also "Commodore-ready" and ready for instant shipment at prices that will amaze you.

CARDCO will constantly increase its line with unique and new products to enhance the enjoyment of computer owners.

Write for illustrated literature and prices or see CARDCO Computer Accessories and Software wherever Computers are sold.



cardco, inc.

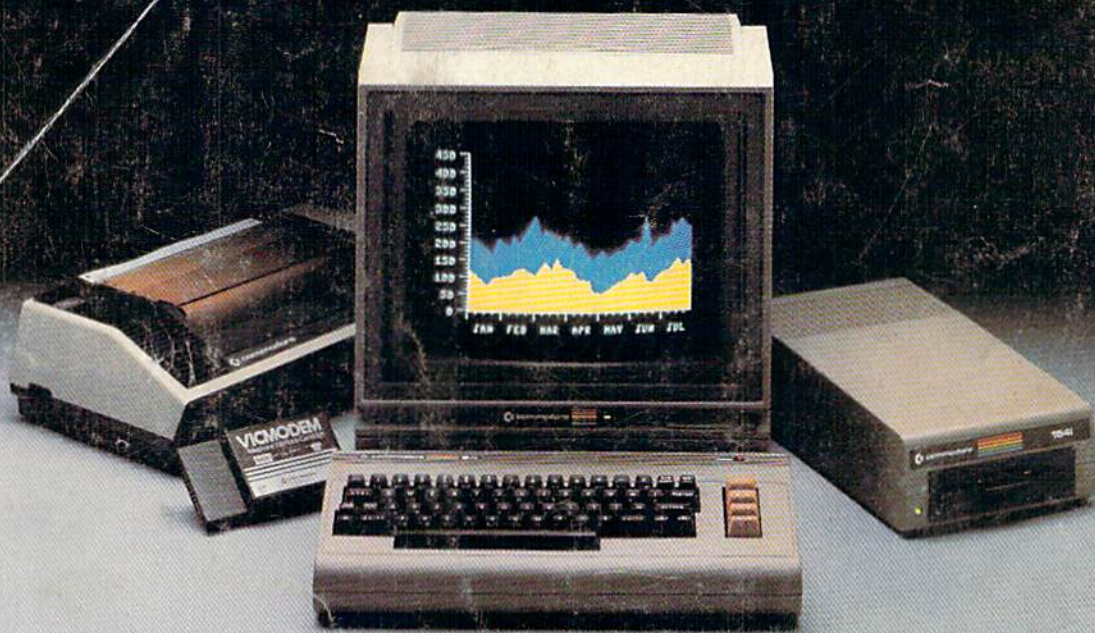
300 S. Topeka Wichita, Kansas 67202 (316) 267-6525

"The world's largest manufacturer of Commodore accessories."

Commodore™ is a registered trademark of Commodore Business Systems, Inc.



IT'S NOT HOW MUCH YOU PAY.



IT'S HOW MUCH YOU GET.

The computer at the top has a 64K memory.

It has the initials I, B, and M. And you pay for those initials.

The Commodore 64™ has a 64K memory.

But you don't pay for the initials, you just pay for the computer. About one third the price of the IBM PCjr.™

The Commodore 64 also has a typewriter-type

keyboard with 66 typewriter-type keys. (Not rubber chicklet keys like the IBM PCjr.)

It has high resolution graphics with 320 x 200 pixel resolution, 16 available colors and eight 3-dimensional sprites.

It has 9-octave high fidelity sound.

The Commodore 64 is capable of running thousands of programs for home and office. And if you add a printer

or color monitor, disk drive and a modem—all together it just about equals the price of the IBM PCjr all alone. With no peripherals.

So you can buy a computer for a lot of money.

Or buy a lot of computer for the money.

COMMODORE 64 

IT'S NOT HOW LITTLE IT COSTS,
IT'S HOW MUCH YOU GET.